

Flight, May 11, 1912.

FLIGHT

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A bird's-eye view of Monaco Harbour and surroundings taken from Renaux's Maurice Farman aquaplane during the recent motor boat and hydro-aeroplane meeting.

EDITORIAL COMMENT.

The King and his Aerial Navy.

The week just ended has truly been an epoch-making one. Not for nearly a century has a British monarch assumed active command of his fleet at sea, and if it were within our province to sketch the marvellous and varied developments in the fighting craft of the seas which have taken place during the period that has elapsed since William IV ruled these realms, the story would indeed be a fascinating one. It is questionable which would derive the greater pleasure from such a story—the writer of it or he who perused it. That point of view, however, does not concern us at all except as citizens of the Empire, which depends for its very existence upon the maintenance of that sea power which has been so remarkably demonstrated during the week, the object-lesson being driven home with redoubled force by simple reason of the Sovereign himself having assumed supreme command of the Fleet. But with certain developments leading up to the increased efficiency of the Naval service, we are more deeply concerned than is implied in the rôle of the more or less detached spectator, and it is to those developments that we would direct the special attention of our readers at this juncture. In the early days of last century, when last a Sailor King ruled our grandfathers, steam propulsion was only just beginning to make its influence felt in the navies of the world. Indeed, we were still building the identical type of sailing battleship which had been evolved during the Napoleonic wars, and it was not until Queen Victoria had already been seated on the Throne for some years that we possessed even the nucleus of a steam navy. Needless to say, the internal-combustion engine had not even been dreamed of. The submarine, while its evolution had been the subject of study for centuries, was not even crudely practicable nor did it become so until internal combustion came to the aid of its students and made it so. And the same may be said of dynamic flight. All through the ages, from the mythical times of Dædalus and his son Icarus, it has been the ambition of man to conquer the last inviolate element—the air—and again it was only the coming of the internal-combustion motor that made this remotely possible. At the time to which we have referred in our opening paragraph, the problem of man-flight was looked upon as absolutely insoluble, and those who believed in its ultimate achievement as utter lunatics. In point of fact, it is not at all necessary to go back even so far as eighty years to find that feeling prevalent. Ten years ago, nay, even five, the doubters were in an enormous majority and the believers as one crying in the wilderness. How the story of the past half decade has been written so far as concerns the solution of that "insoluble" problem need not be set down here—it is known full well even to the most casual observer. But we may, perhaps, be pardoned for saying this much—that from the believed impossible it has progressed in that short time to become almost one of the commonplaces of our times.

King George, as the nation knows, received his early training in the Navy, of which he is the supreme head, and progressed through its various grades, from cadet to captain, before the necessities of State duties caused his retirement from the active service of the senior arm. Even in the comparatively few years that have elapsed since his retirement, wonderful strides have been made in the *matériel* and equipment of the fighting units of the Fleet. He has, however, kept himself thoroughly abreast

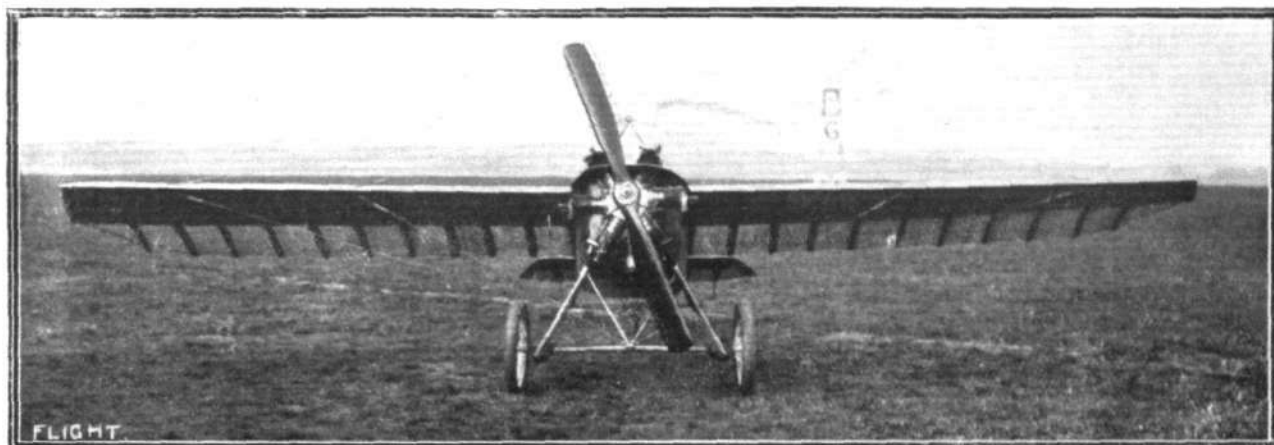
of all the developments of science as applied to modern navies, but it is greatly to be doubted if even he, with all the interest he has always displayed in the service to which he once actively belonged, can have realised the full possibilities of the aeroplane as an adjunct to the Fleet, until the demonstrations which were provided for his inspection during the week. The exigencies of weekly journalism compel the penning of these lines before the full record of the week has been achieved, but even at the moment of writing, enough has been done to show that if anything, even the firmest believers in the future of aircraft have under-estimated their scope of usefulness. Particularly do we think the hydro-aeroplane—or to give it the shorter titles which have recently been coined, the aquaplane or water-plane—has made good its case for better consideration than has been given to it in the past. This is a type of craft in which we have always voiced the fullest confidence, and if its evolution is relatively more backward—though in the light of recent happenings, this is by no means certain—than its sister of the land, it is simply because those in whose hands has lain the evolution of the aeroplane have been landmen and not sailors, professional or amateur.

A fortnight ago at some length we once more dealt with the possibilities of the hydro-aeroplane as a medium for pleasure flights at our seaside resorts, and are pleased to note that the idea has been adopted with enthusiasm by the *Daily Mail*, to whom aviation is already under a heavy debt of gratitude. In amplitude of our remarks on the occasion in question, we should like to put it on record that in our advocacy of flights for pleasure, we had in mind something more than the mere pleasure-cum-commerce aspect of the matter. We have never tired of urging that there is only one way in which our fighting services can arrive at aerial efficiency, and that is through a real awakening of public interest to the pressing need of developing our resources. And there is no way of creating that necessary public interest save by ocular and incontrovertible evidence of the capabilities of aircraft. The man in the street believes in the possibility of flying, for he reads every day in his newspaper of successful flights, and one among many of him once saw an aeroplane in flight. But to the bulk of the people aircraft are still something impalpable and afar off—they do not realise because they have not seen. But supposing our suggestion to be carried out, and each of our fashionable watering-places to be provided by enterprising hydro-aeroplanists with a practical machine on which demonstrations and passenger flights can be given. Everyone goes to the seaside at some time during the year, and, therefore, by parity of reasoning everyone must see and realise. To provide every seaside resort with such a machine may sound rather like an ambitious programme, but then flying is ambitious in itself, and, moreover, we see no reason at all why it cannot be done—not this season, perhaps, but certainly next. We like the *Daily Mail's* suggestion that municipalities themselves might try the experiment of chartering hydro-aeroplanes and pilots to fly them, though we are not quite certain about their statutory powers in this connection. But, however it is done, we can see in the development of the idea a means of bringing home to the people how absolutely essential it is that the Navy primarily, and the Army in almost equal degree, shall be fully equipped to meet their rivals in the air.

THE CAUDRON MONOPLANE.

LOOKING at this diminutive monoplane, it seems really difficult to believe that such a tiny construction of wood, steel, fabric and wire could take Ewen through the air from Crotoy to Cap Grisnez at a speed of not less than ninety-five miles per hour, and could bring

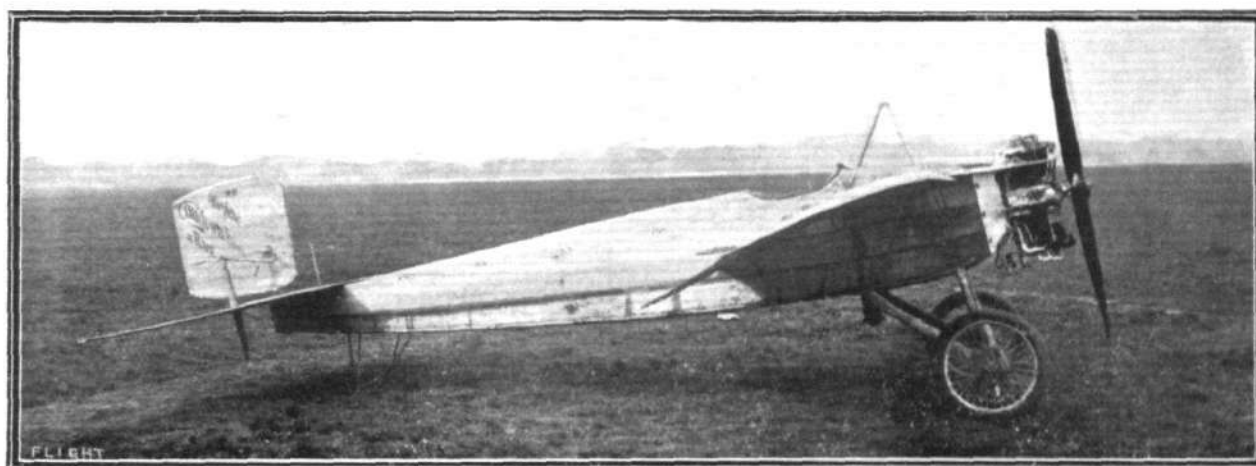
a purely rectangular body is known to set up when travelling through the air, each side of the body is belled out by light longitudinal formers of French poplar, over which the fabric is stretched. The *fuselage* proper is that type of structure now almost universally



The Caudron monoplane, front view.

him safely across the Channel. Yet it did so. Compared with some monoplanes with which we are more familiar, the machine seems almost absurdly small, for each wing, detached, looks more like a spare tail than a major sustaining surface. But it has proved

employed—a simple lattice girder of ash and steel wire, braced up together in exactly the same fashion as a Blériot body. Capping the front end is a sheet steel plate to which the motor is bolted, a type of mounting which, both for rotary and stationary motors,

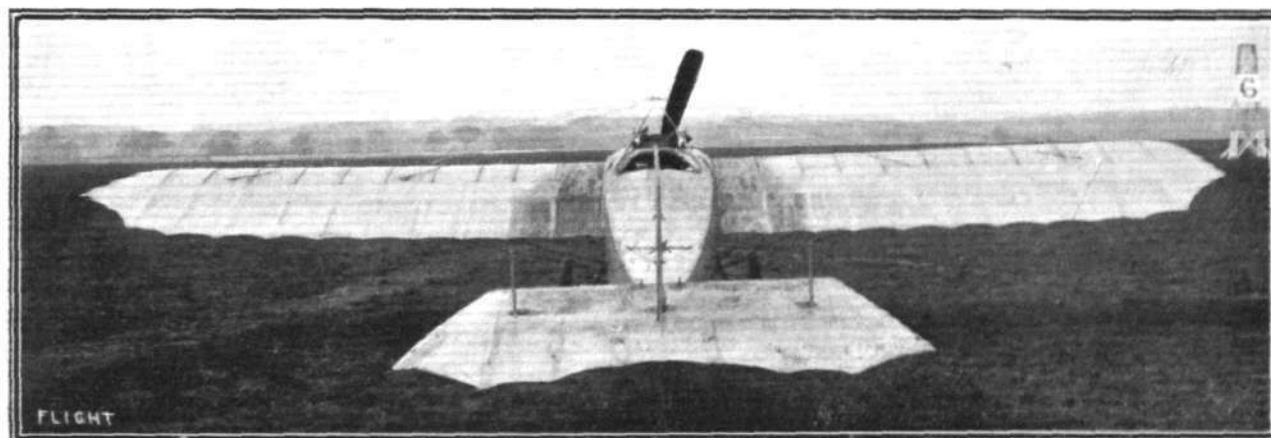


The Caudron monoplane, side view.

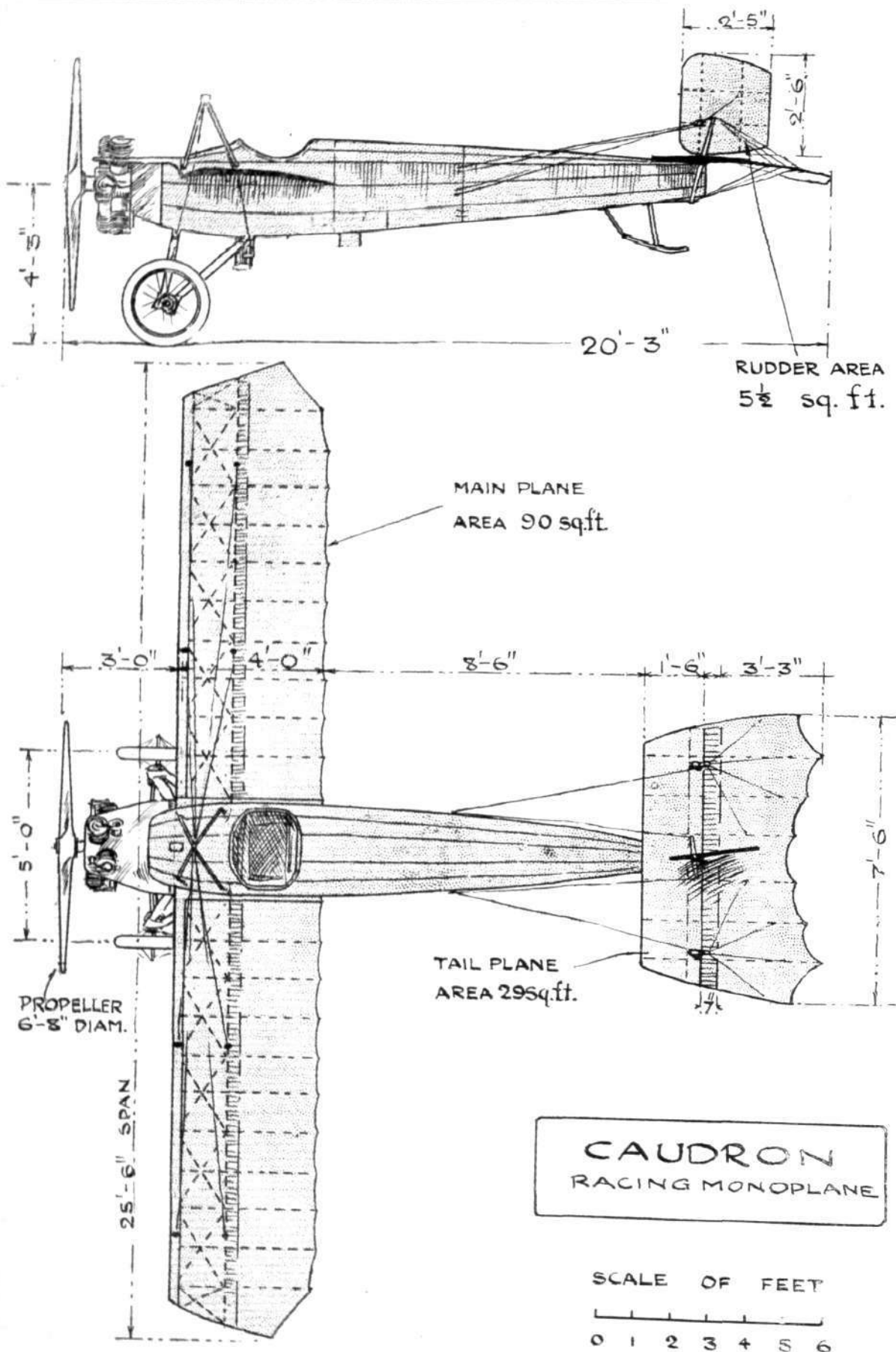
itself to be capable of doing the work, and so we can only look at it, marvel, and write down Caudron a very clever constructor.

Its main body is totally enclosed with fabric, and for its length is unusually roomy. To avoid or minimise the edge disturbance that

has come into quite general use of late. As a subsidiary support steel tubes are carried from the *fuselage* to the front of the crank case. While on the subject of the engine, it may be interesting to mention that the motor fitted to this particular



The Caudron monoplane, view from behind.



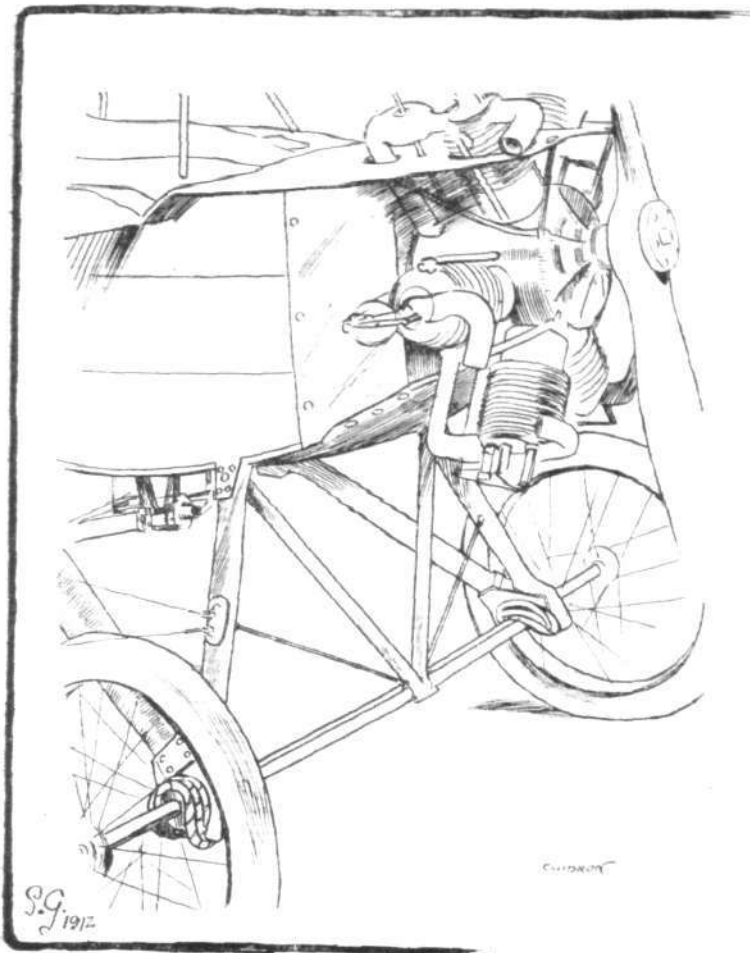
THE CAUDRON RACING MONOPLANE.—Plan and elevation to scale.

monoplane is the first of its type—a six-cylinder radial air-cooled engine of 45-h.p.—to leave the Anzani works. According to the pilot's testimony, the machine never faltered throughout the whole trip, and ran singularly free from vibration. The magneto and oil-pump—the latter feeding the oil to the motor *via* glass inspection

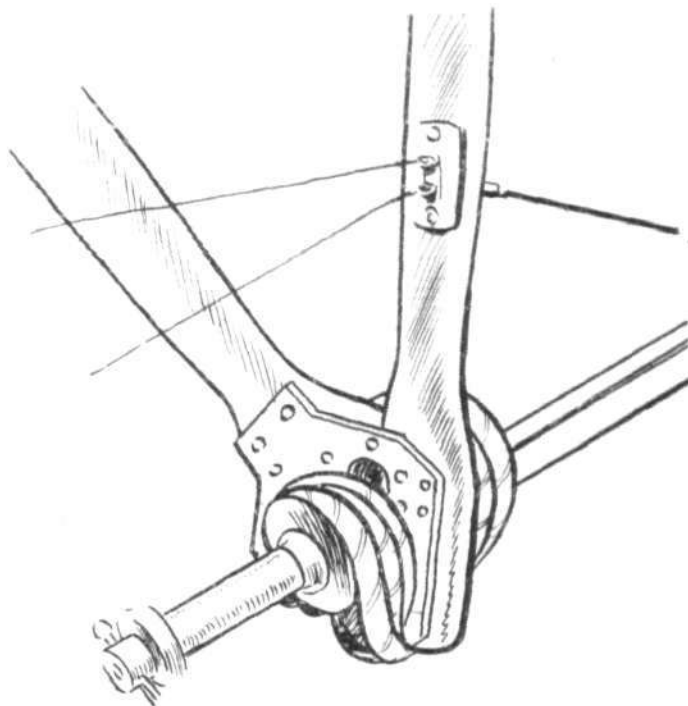
caps similar to those in the Gnome equipment—are fitted to the back of the steel engine plate; where they may easily be reached through an inspection door covering the front section of the left-hand side of the body.

A 6-ft. 8-in. propeller of Messrs. Caudron's own manufacture, direct coupled to the engine crank-shaft, provides the thrust. It is cut from a single piece of wood on lines very like the Normale, but unlike that well-known make it is not covered with canvas.

The landing gear, of ash and steel, must be immensely strong. It certainly is simple enough, effective enough, and presents little head resistance. It consists of two pairs of stout ash struts arranged V-fashion on either side. A steel bar unites the apexes of the two V's, and an inverted V of steel tubing completes the structure. The rods on which the wheels are mounted are hinged to the centre of the chassis, and extend to right and left-hand on either side. They pass



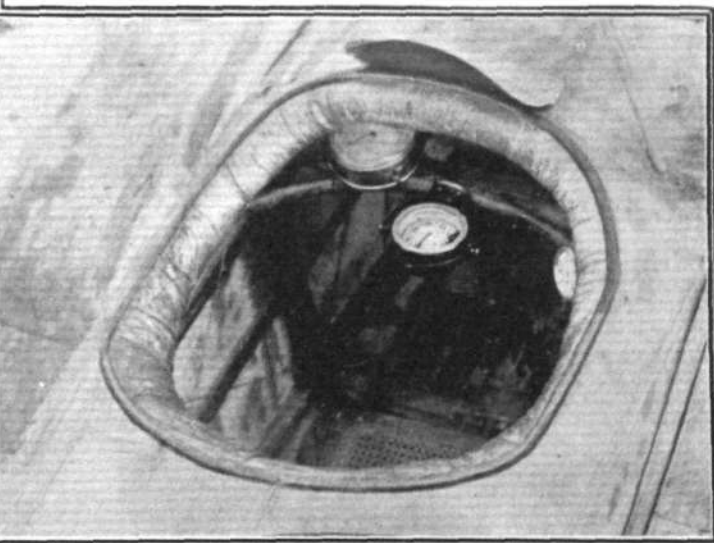
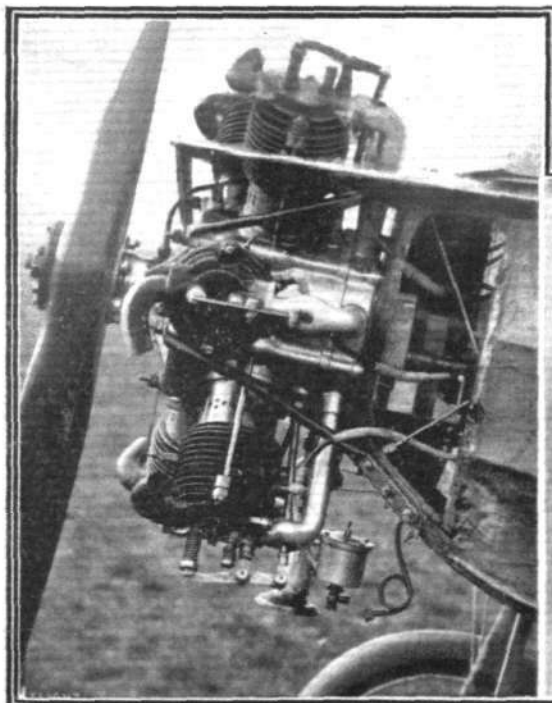
THE CAUDRON MONOPLANE.—Details of the landing chassis and engine mounting.



Details of the Caudron shock-absorbing arrangement.—The wheel is omitted for the sake of clearness.

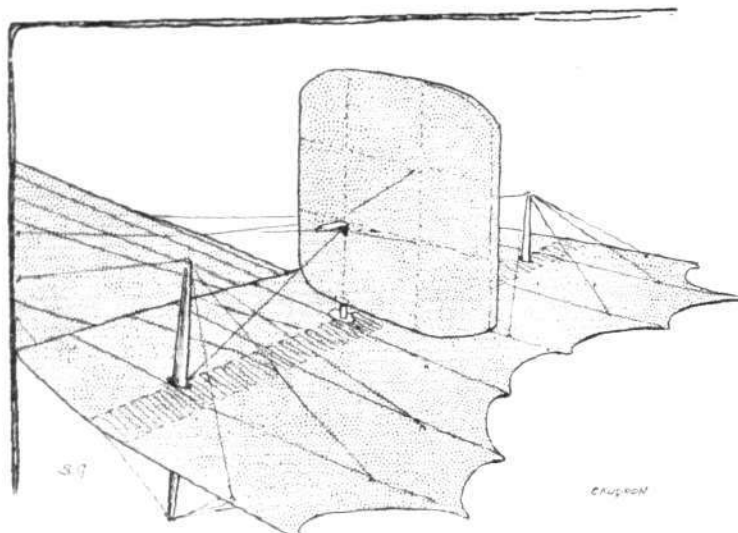
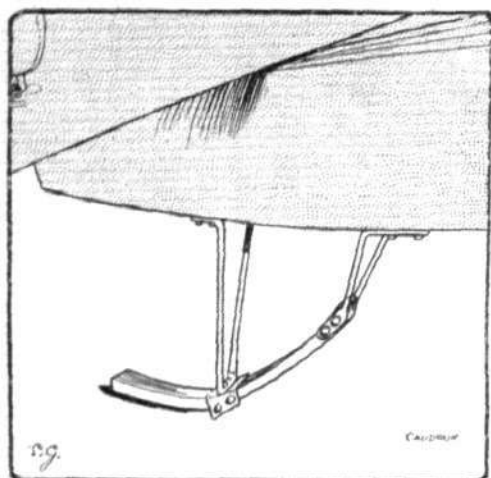
under crutches integral with the bases of the two V's, and support the weight of the machine through rubber shock absorbers. A better grasp of this detail can be obtained from the accompanying sketch than could possibly be drawn from a mere word description.

A curious point in connection with the wheels, a point on which, we are assured, Messrs. Caudron have been granted a patent, is that



DETAILS OF THE CAUDRON MONOPLANE.—On the left the mounting of the 45-h.p. Anzani motor, showing the magneto and oil-pump to the rear of the mounting plate. On the right the interior of the cockpit.

they are arranged slightly splay footed—if we may use a colloquial term. Both axles slope back slightly from the line at right angles to the rolling path—a feature which, it is claimed, renders the machine immune from a tendency to suddenly turn to right and left of its true path when rolling. Whether it does so or no is for practical tests to decide. We should think the tyre wear would be rather excessive if the machine were used for much school rolling practice.

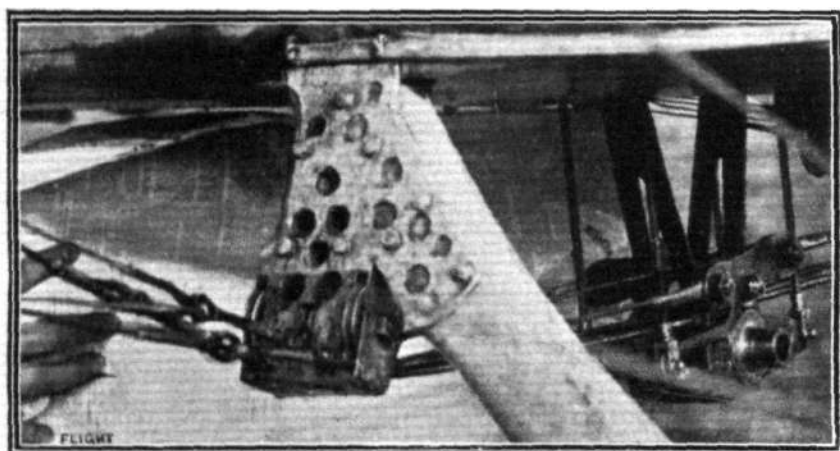


The tail of the Caudron monoplane, and on the left details of the tail skid.

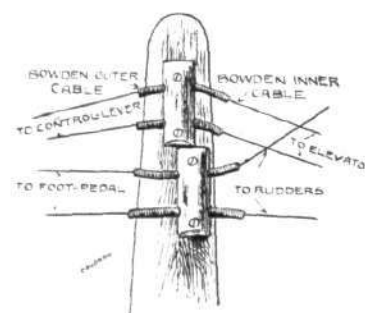
On the new military monoplanes that the Caudron firm are now turning out an all-steel chassis is employed, while some of those in commission over the sands of Crotoy are not provided with any shock-absorbing apparatus at all. It seems to us that, even for the rougher work that the machine will have to undergo in Britain, the shock-absorbing device—although excellent—could very well be suppressed if its place were taken by extra large diameter tyres. At the most, only two inches of upward travel is provided by the rubber shock absorbers, and this could very well be afforded by a tyre of increased dimensions. Not only for this reason should larger tyres be recommended—they would, in such a small machine as this one, help to a great extent to keep it afloat should it at any time have to

preclude any suspicion of the wing failing through momentary top pressure. By the way, it would be interesting to know the effect of top pressure on the rear flexible portion of the wing. The warping cables and their attachments are quite as stout as those taking front weight, for under ordinary level flying they must take almost as great a share of the load as those in front, while when in a climbing attitude it is quite conceivable that they may take more. One of our photographs shows the details of the warping control.

Clamped to the rear of the fuselage by U bolts, and braced there by steel wire, is the horizontal tail surface. It is purely directional, and its rear two-thirds flexes on the same principle as the main planes. In addition to flexing up and down for elevation and depression, it, similarly to the tail of the Caudron biplane, warps laterally in conjunction with the wings. Direction control in a horizontal plane is obtained by a vertical rectangular rudder,



Details of the warping mechanism of the Caudron monoplane.



The method adopted on the Caudron monoplane of guiding control wires.

alight on water. Two tyres of a tubular diameter of six inches, and of a rim diameter of 26 inches, will support something like 180 lbs.

A peculiarity of the wing construction is that, roughly, two-thirds of the wing chord is extremely flexible. The two booms in front—they are essentially stout steel tubes, wood filled—are united by strong solid ash ribs and steel wire cross-bracing to form a girder of immense strength. The flexible trailing edge is formed by continuation of the ash strips applied to the underneath of the solid ribs. These are whittled away to round section, where they leave the back spar, and are enclosed, over the flexible portion, by fabric covering on the single surface principle. Double surfacing is used on the front section of the wing, and to further strengthen it to withstand the intensity of suction that must occur over that part in a wing travelling at something like 85 miles per hour, a wide strip of aluminium sheeting is applied. Both booms are accommodated by sockets in the side of the fuselage, the front one being quite a tight

balanced and mounted entirely above the fuselage. A small skid, the flexibility of which is provided by its laminated construction of wood, protects the tail.

An interesting detail in connection with the control—all control wires are of Bowden inner cable, fitted everywhere in duplicate, and guided at necessary points by Bowden outer sheathing. Only in one point is this rule transgressed, and that is where the top warp-compensating wires pass over the upper pylon. Here they slide through copper tubes, Nieuport fashion.

The pilot sits extremely low in the body—just four inches off the floor, so that only his head emerges above the well-padded sides. He grasps a single ash vertical lever that controls the elevation and warping, and operates the rudder with his feet. All his engine control and his instruments for cross-country flying are quite handy, and altogether he is very comfortably installed in a very excellent little machine.

FROM THE BRITISH FLYING GROUNDS.

Brooklands Aerodrome.

BEFORE breakfast, on Wednesday, May 1st, Brooklands was visited by some members of the Royal Flying Corps, who flew over from Farnborough. Captain Burke arrived on the Aircraft Factory tractor machine, and Lieuts. Fox and Broke-Popham on Farman types. After a short stay they returned to headquarters. During the early morning Macdonald made a circuit on Vickers No. 4. At the Bristol School, Sheppard was receiving instruction from Pizey, after which he made a number of solo flights. Cadet Robinson was making straights on the taxi Deperdussin. The evening was fairly calm and Lieut. Parke brought out the Avro monoplane for its first trial. He contented himself with rolling, to get used to the controls, which she answers very quickly.

About 3.15 p.m., Moorhouse started for Hendon, but after rising about 2,000 ft. came back, as he found it too foggy. Later he started again, but soon turned back for the same reason. Valentine flew over from Hendon on the Bristol monoplane, taking nearly an hour against the strong head wind. Cadet Wheeler made a fine post-brevet flight on the Bristol biplane during the evening, and "Partridge" was out for some time on the Hanriot, flying very well with the A.B.C. engine.

Thursday was rather windy, but in the morning some flying took place. Fisher was on the Flanders for the first time since his bicycle accident, flying with his left arm strapped down. Pizey on the Bristol gave instruction to Sheppard and Arthur, the former then making his first circuit in very good style. On the Deperdussin Robinson was doing straights, as also was Parke on the Avro monoplane. Raynham later brought out Sopwith's Burgess-Wright for its first trials with a 35-40-h.p. Green engine. The machine apparently flew as well as with the Gnome, but unfortunately after the flight while running the engine a back-fire occurred, breaking both propellers off their bosses.

Friday proved a splendid day. The Bristol school was very busy, Bulkeley, Arthur, Sheppard and Lewis all receiving tuition from Pizey, the last two afterwards making their first figures of 8. Nesham and Wheeler also were out for long solo flights. Raynham and Sopwith both carried passengers on the Green-engined Wright, and Raynham also gave instruction to pupils on the old Howard-Wright biplane. Robinson was again making straight flights on the taxi Deperdussin, while Petre and Sabelli flew the racer. On the Flanders Fisher took up Jones for a couple of passenger trips and made a number of solo flights to test the effect of towing a Marconi aerial, Manning, in about half an hour, making straight flights on the same machine. Percival brought out his tractor biplane for the first time since it has been rebuilt after the last smash, and made several circuits of the ground, but when over the sewage farm he attempted a sharp right-hand turn, with disastrous results, as he side-slipped and finished with a spiral dive on to his nose. He was unhurt, but the machine was a pretty thorough wreck. Parke, on the Avro monoplane, was feeling more at home, and flew for some time, reaching about 600 ft. This machine gives one a very curious impression, as the pilot, being totally enclosed, is invisible from the outside. Col. Hoskins was making straights on the Vickers, and Spencer, Valentine, and Moorhouse were all out, Valentine flying round about 40 ft. over the track, to time the machine over measured distances. "Partridge," on the Hanriot, was also for some time flying outside the track at a fair height. Saturday was a disappointing day, after Friday. In the early morning, a small amount of school work was got through, Sheppard and Lewis practising figure 8's on the Bristol, and Fisher giving a passenger flight to Lieut. Babington on the Flanders. In the afternoon there was to have been a handicap race round Chertsey in connection with the B.A.R.C. motor race meeting, but owing to wind and heavy drizzle it had to be postponed. Late in the evening, however, Moorhouse went out for a short time, as also did Parke and Raynham, but finding it very unpleasant did not continue for long.

Sunday was a slight improvement on Saturday. In the morning Lewis and Sheppard passed the first half of their tests for the R.Ae.C. *brevet*, but in landing at the end of the second test Lewis broke the right-hand tip of the bottom plane. Lieut. Hewlett was out on Mrs. Hewlett's racing-type Farman. Though it was rather windy in the afternoon, a quick get-off competition was arranged by the Brooklands Aero Club, and later a cross-country race to Chertsey and back for a cup presented by Mrs. Malcolm. The quick get-off brought out Mrs. Hewlett, Sopwith, Raynham, Fisher, Spencer, Sabelli, Petre and Moorhouse. Mrs. Hewlett proved the winner, Sabelli on the Deperdussin racer being second, and Sopwith on his 70-h.p. Blériot third.

The cross-country handicap proved very exciting, and was won by Sopwith from scratch, who only succeeded in overtaking Pizey, who was limit man, in front of the sheds, winning by a bare length. Raynham on the Burgess-Wright was third. After the race there

was a good deal of exhibition flying. Spencer made a few flights on his biplane. Abbott took out Mrs. Hewlett's biplane, but seemed to find it rather too gusty for him. On the Bristol Pizey and Hotchkiss were out with pupils, and Fisher, on the Flanders, was out for a short time.

The event of the evening, however, was when Sopwith brought out the Coventry Ordinance biplane for its first trial. Mr. Manning, the designer, accompanied him in the passenger seat. Sopwith made several straight flights, getting off the ground with great ease and carrying the tail very high, though the ignition on the 100-h.p. Gnome had been slightly retarded for the first trials. The wheel-base, which relies on very large tyres for taking the shocks, answered admirably, and, as Sopwith put it, the unsprung wheel-base was the best sprung one he had ever tried.

Monday was another bad day, in the morning Pizey being the only one out, giving instruction to Bulkeley. In the evening Sopwith brought out the Coventry Ordinance again, Manning accompanying him once more, and made a number of straight flights at a height of about 30 ft. to test the controls and balance.

Eastbourne Aerodrome.

ALTHOUGH the weather experienced during the past week was not really bad, it was not good enough for novices, so very little out-door work was done. Saturday was the best day of the week, when Fowler made several flights on the new bus. All the school machines have been thoroughly overhauled and are now in first rate order. The 28-h.p. Anzani-Blériot is ready for trial and looks quite smart with its aluminium side shields and new wings. A new workshop, measuring 47 ft. by 90 ft., is in course of erection. It will be fitted up with all the necessary plant, &c., for the building of machines, as the Company now intend to seriously turn their attention to this branch of the industry. Lieut. Swan, R.N., has recently joined the school, and will start his course at the end of the month.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Among the new pupils who have joined the school last week are Capt. Nicholas, of the Indian Army, Commander Yeats-Brown, and Mr. T. O'B. Hubbard, late of the Aeronautical Society.

Tuesday morning was rather gusty; wind, however, dropped about 6 p.m. and school turned out. On biplane No. 3 Mr. R. H.



Mr. Collins Pizey, of the Brooklands Bristol School, and his cousin, Mr. C. H. Pizey, in the passenger's seat.

Kershaw (a new pupil) was rolling; Mr. T. O'B. Hubbard doing straights and half circuits; Messrs. Morris and Roupelle straights, and showed good progress; Messrs. Biard and Manton flying circuits. On-biplane No. 5 Mr. Lewis Turner was out at circuits prior to taking up a passenger, and afterwards going to the assistance of Mrs. Stocks, whose engine in biplane No. 10 had stopped on the far side of the aerodrome. Capt. Nicholas, another new comer, was rolling on monoplane No. 4, and at his second attempt made a short straight flight.

Pupils all out very early on Wednesday. On Biplane No. 10, Messrs. Biard, Fowler, Hucks and Gates were all doing circuits. Mr. Biard, in addition, put up some figures of eight and right-hand turns, showing himself to be quite ready for *brevet*. On Biplane No. 3, Messrs. Hubbard and Manton made circuits, and Messrs. Morris and Kershaw good straights, Capt. Nicholas on Monoplane No. 4 rolling, and later Mr. Lewis Turner made a short flight on same machine. Mr. B. C. Hucks busy at circuits on Monoplane No. 6, Mr. Morris rolling on Biplane No. 3, and Mr. Lewis Turner at circuits on Biplane No. 5.

Mr. Lewis Turner opened a full day's work on Thursday by flying several circuits on Biplane No. 5, afterwards taking up Commander Yeats-Brown in the passenger seat for his first lesson in controls. Mr. Grahame-White in the afternoon made two passenger flights, followed by Mr. Lewis Turner with more passengers. On the same machine Mr. Hucks, whose engine stopped at 100 feet, being unable to restart it, pancaked down, smashing the machine pretty badly, but escaping unscathed himself. On Biplane No. 10, Mr. Gates and Mr. Lewis Turner were doing circuits, and also Mr. Biard, who flew the first half of his *brevet*; Biplane No. 3 was also in the hands of Mr. Gates, afterwards being taken over by Mr. Lewis Turner, who was in the passenger seat initiating Commander Yeats-Brown into the mysteries of rolling for over three-quarters of an hour.

Mr. Lewis Turner, Mr. Gates and Commander Yeats-Brown arrived at the school at 4 a.m. Friday, and put in a great deal of work. Mr. Gates doing circuits and right-hand turns. Mr. Lewis Turner was first in pilot's seat and afterwards in passenger seat, giving instruction to Comm. Yeats-Brown in straight rolls. At 5 a.m. many more pupils turned up, and Messrs. Hubbard, Roupelle, Kershaw, Comm. Yeats-Brown, Morris were all busy at straight flights on Biplane No. 3. Capt. Nicholas was rolling on Monoplane No. 4, and after a short adjournment for breakfast, the school again returned to work. Comm. Yeats-Brown started off again with straight flights on Biplane No. 3 followed by Messrs. Roupelle, Morris and Major Liles; Capt. Nicholas and Mrs. Stocks on Monoplane No. 4 putting in good practice at rolls and hops. Mr. Hucks on Monoplane No. 6 flew several circuits and cross-country flights, all the rest continuing work, with the exception of a slight break for lunch, until dark.

On Monday last Messrs. Manton and Hubbard when at circuits on Biplane No. 3 found engine missing slightly, so Mr. Lewis Turner took over machine for test flight before turning machine over to Messrs. Kershaw and Roupelle, who flew several straights. Mr. Lewis Turner then took up Comm. Yeats-Brown in the passenger seat for instruction in straight flights. Mrs. Stocks went out for rolling on Monoplane No. 4, and Capt. Nicholas got in some short

straight flights on the same machine. Mr. Lewis Turner made a test flight prior to taking up a passenger, and later did several straight flights for the benefit of some Press photographers.

Blériot School.—No work was possible on Monday last week owing to inclement weather. Messrs. Aubert, Thomsen, Pothet, Teulade and Clappen, however, all put in a good morning's work on Tuesday, the former three pupils doing circuits in very good style and the latter, straights, with the tail well up. Messrs. Thomsen and Aubert were putting in circuits next day at a good altitude, preparatory to going for their *brevet* tests, for which, together with M. Pothet, they are now practically ready.

On Thursday M. Aubert was out early, and flew a circuit, and then had to stop owing to rising wind.

Seven pupils managed to put in a very good day's work on Friday, Messrs. Aubert and Thomsen doing circuits, the former on one occasion going right outside the aerodrome, and completely out of sight for some time, and then turning up again over the fence in a very happy frame of mind after his first cross-country flight. Mr. Thomsen then took up the same machine, and did a circuit, and turning somewhat abruptly made an unpremeditated *atterrisage*. Messrs. Welburn, Morris, Hall, Teulade, and Clappen confined themselves to straights, and one pupil gave during the course of the afternoon one of the most amazing exhibitions of small circuits on the ground, with the engine all out, that has probably ever been seen. The spectators on the ground were all discussing at what point the landing chassis would give out, but it stood up to its work in marvellous style, and nothing went.

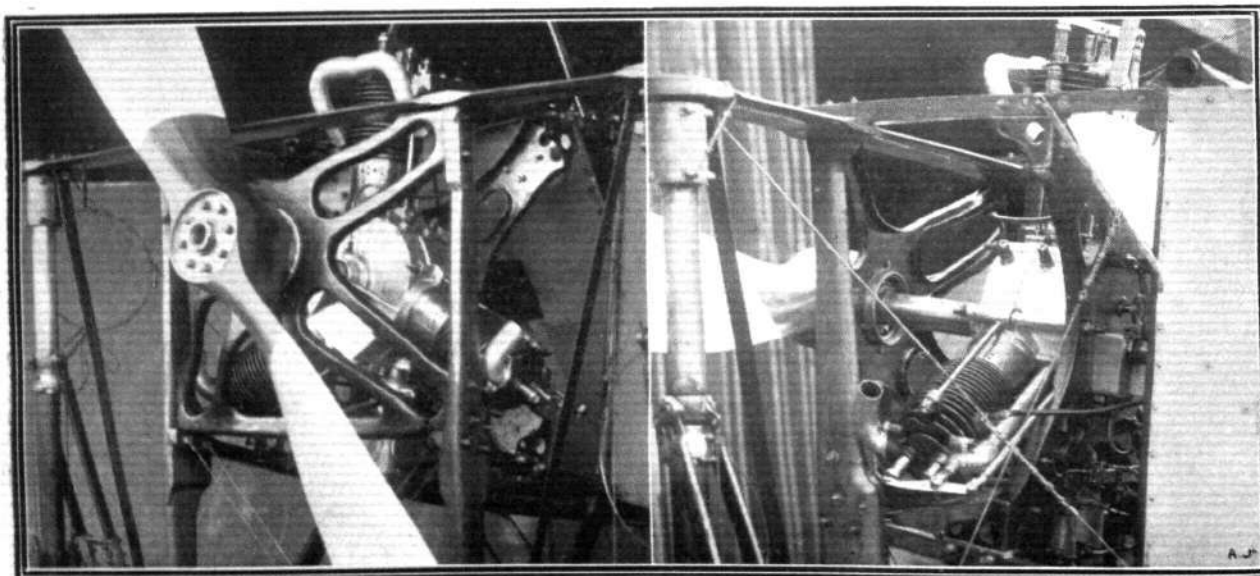
Late in the afternoon, Mr. Crawshaw, a one-time pupil of the School, took out his latest pattern Blériot fitted with a 50-h.p. Gnome motor, and starting from a peg driven into the ground, by releasing the catch, made a beautiful flight over Elstree at a height of about 2,000 ft., descending after about 12 minutes with a perfectly calculated *vol plané*, and landing in such a position that had he desired he could almost have made another flight with the machine anchored to the same peg as the one used in the preceding one.

Owing to the wind and rain on Saturday no work was possible for any of the pupils.

Salisbury Plain.

Bristol School.—On Monday last week Jullerot was out first thing on Biplane No. 55, afterwards giving two lessons to Lieut. Pickles, and Bendall gave two flights to Mr. Lindsay Campbell. Lieut. Antonini made a fine cross-country solo on the Bristol monoplane with Lieut. Ercole as passenger, flying over Shrewton Bereford, Salisbury and back, landing with a perfect *vol plané* from 1,000 ft. Messrs. Jennings and Smith Barry were up for solos on tractor biplanes, Lieut. Stuart getting in some useful rolling practice on one of the monoplanes, followed later by Mr. Smith Barry. Capt. Cordner went for his first solo on Biplane No. 43, after which nothing further was done. In the evening Jullerot made a trial with Lieut. Wall as passenger, but weather was too bad for further flights.

Pixton was the first out next day, taking up Lieut. Dawes, a new pupil, whilst Bendall flew Mr. Lindsay Campbell. The rising wind prevented further work.



Showing the method of mounting one of the new 35-h.p. Y-type Anzani motors in a Blériot monoplane. The photographs are of Mr. Preseill's Blériot at Hendon.

A trial was made by Jullerot in the afternoon on one of the Bristol two-seater monoplanes, who afterwards gave tuition flights to Lieuts. Wall, Dawes and Pickles, and Mr. Campbell and then to Lieut. Fisher, a prospective pupil. Mr. Pixton was on one of the Bristol monoplanes with Capt. Grace and Lieut. Wall. Solos were made by Capt. Grace and Lieut. Hartraa on Biplane No. 55, describing a complete circuit and finishing with a good landing. Bendall took Lieut. Pickles and Mr. Campbell up on Biplane No. 55.

After the usual trials on Wednesday, Lieut. Hartraa, observed by Lieut. Conner and Reynolds, passed the necessary tests for his certificate. He made some very fine figures of eight, and finished his trials by climbing to close upon 1,000 ft. and landing with a very clever *vol plané*. This pupil had only two solos at the School before undergoing his tests, an excellent performance. Jullerot with Bendall on one of the Bristol monoplanes went for cross-country flight over Maddington, Shrewton and back to the sheds. Lieut. Pickles and Mr. Campbell out for tuition with Pixton on biplane No. 55, Bendall taking Lieuts. Dawes and Rinaldi. Jullerot carried Mr. Kirby, a prospective pupil. Lieut. Ercole out for first straight lines on single-seater monoplane, whilst Lieut. Hall flew a complete circuit on similar machine at 100 ft., making a good landing. Capt. Grace got in two good solos on Biplane No. 55.

There was no flying on Thursday morning but towards the evening Jullerot was out with Mr. Campbell on one of the Bristol monoplanes, Pixton taking Major Boyd Moss (a new pupil) and Lieut. Dawes and Pickles. Jullerot was testing a new machine just received from the works at Filton, Bendall also flying it then. Jullerot on No. 55 took Major B. Moss. Lieut. Hall made a fine flight on Bristol single-seater monoplane.

On Friday Jullerot was out first with Major B. Moss, Pixton taking Mr. Campbell and Lieut. Pickles. Major B. Moss was up with Jullerot. Good solo by Lieut. Ercole on Bristol monoplane. Lieut. Hall was flying one of the tractor biplanes. Mr. Jennings also on this machine. Lieut. Stuart, first of all solo on tractor biplane and then out on monoplane making good flights. Capt. Grace did fine solo on Biplane No. 55 flying at 800 ft. over Cavalry Barracks. Mr. Pixton was out in the evening with Mr. Campbell and then with Lieut. Pickles, whilst Bendall was up with Lieut. Dawes and Mr. Campbell on Biplane No. 42. A good flight was made by Jullerot in one of the Bristol two-seater monoplanes, Major Boyd Moss being passenger. Mr. Jennings was up for a trip on one of the tractor biplanes and Lieut. Hall went out on one of the single-seater monoplanes. Mr. Smith Barry made a couple of solos on this same machine reaching to fully 1,000 ft. and landing by means of a clever *vol plané*. Lieut. Ashton was on a monoplane for 10 mins. rising to 450 ft., Lieut. Ercole also on a Bristol monoplane round Fargo and back. Lieut. Wyness Stuart brought matters to a close with a good monoplane flight.

Saturday morning was foggy and little work was done. Lieut. Rinaldi was out for rolling practice on a Mono, whilst Bendall took up Lieut. Dawes this being the extent of the flying.

Royal Flying Corps.—Some good flying was put in by the corps on Tuesday of last week when Lieut. Reynolds went up several times on "F 4" biplane. On one trip he carried two R.E. sappers. Lieut. Conner also made a useful flight on this machine, and afterwards did some rolling practice on the Blériot monoplane. No flying possible on Wednesday owing to the unsettled weather, but conditions were almost ideal on Thursday when Capt. Fulton was on his Anzani-Deperdussin monoplane and made a couple of good flights. He then took a brother officer for a lengthy trip on "F 4" biplane. Lieut. Barrington-Kennett, who has been on leave, had his Nieuport monoplane out, and was in the air for half-an-hour at a height of 1,200 ft., finishing with a fine glide. Lieut. Reynolds took up several officers on "F 4," and each time landed by a spiral *vol plané*. On Friday, Capt. Fulton was again



Naval Aeroplanes at the Review.

THE battleship "Hibernia," which, as we mentioned in our last issue had been fitted in the bows with a launching platform and had four aeroplanes on board, duly arrived at Portland to act as mother ship to the aquaplanes during the Naval Review. Three of the machines were landed on the 3rd inst., and Commander Samson immediately tested "H.M.S. 'Amphibian,'" officially supplied as Short No. 41, which had been fitted with three torpedo-shaped floats thus converting it into a hydro-biplane. He got away from the beat-ship in front of the hangar at Portland, circled round the Fleet at anchor, and then returned to his starting point. He made three trips on the following day on this machine, in one of which he was accompanied as passenger by Admiral Callaghan's daughter, when Capt. Gerrard and Lieuts. Grey and Longmore were also flying over the Fleet. Lieut. Grey was up over two hours on the Deperdussin.

On Monday, the ships in the harbour moved out to meet the remain-



Mr. Lucien A. Tremlett, one of the pupils to recently obtain his aviator's certificate at the Blériot School at Hendon.

on his Deperdussin and Lieut. Barrington-Kennett made a flight to test the weather conditions. On coming down his engine was thoroughly tested and the machine overhauled, previous to starting off with Corporal Ridd, R.F., for Farnborough. The trip was safely accomplished in 40 minutes. Capt. Fulton after further flights on his Deperdussin changed over to "F 4" and took up Capt. Mackworth, R.F.A. Capt. Loraine was on "F 5" biplane making altitude tests for his superior certificate. He climbed quickly to a height of 1,400 ft., and came down by a spiral *vol plané* with the engine shut off and landed within the given area. He afterwards took up Capt. Popham, R.F.A., for a scouting trip of forty minutes round the Cavalry school, &c. Another change for the worse in the weather prevented any flying on Saturday, but on Sunday Capt. Fulton was on his Deperdussin and also on "F 4," while Lieut. Conner also put in some practice on the latter machine. On Monday Capt. Broke-Popham arrived at 7.30 a.m. from Farnborough on "F 7" biplane. Lieut. Fox who also started from Farnborough had to come down at the Wallops, owing to a petrol pipe breaking. Lieut. Barrington-Kennett also started from Farnborough but went back owing to fog, while Capt. Burke with Lieut. Hault as passenger, succeeded in making the journey, and arrived at Salisbury Plain at 7.30 p.m., in the rain, having had to land four times to find his way.



der of the Fleet so that they might all come in together and as a preliminary to the flight to be carried out late in the week, Commander Samson flew out on his hydro-aeroplane to escort them in. The fleet was met about twelve miles out at sea, and Commander Samson then returned to Portland, circling over the harbour once or twice before alighting on the water, just by his shed. Earlier in the morning he had been flying the Short monoplane at Lodmoor, where the other naval aviators had been practising. Besides the Short machines there is also a Deperdussin and a Nieuport. In the afternoon Lieut. Gregory made a long flight over the Fleet on an ordinary Short biplane.

The Admiralty Increases Its Order.

No doubt as the result of the successful running of the Short hydro-aeroplane at Portland, the Admiralty, it is understood, has decided to increase the number of hydro-aeroplanes to be purchased in the immediate future to twenty-five.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

NOTICE is hereby given that a Special General Meeting of the Club will be held at 166, Piccadilly, London, W., on Tuesday, 14th day of May, 1912, at 4.30 p.m.

AGENDA.

To elect Mr. Roger W. Wallace, K.C., a Vice-President of the Club.
166, Piccadilly, London, W. By order of the Committee,
4th May, 1912. H. E. PERRIN, Secretary.

Public Safety and Accidents Investigation Committee.

A meeting of the Public Safety and Accidents Investigation Committee was held on Tuesday, the 7th inst., when there were present:—Col. H. C. L. Holden, C.B., F.R.S. (in the Chair), Mr. A. E. Berriman, Mr. G. B. Cockburn, Capt. J. D. B. Fulton, R.F.A., Mr. F. K. McClean, Mr. W. O. Manning, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, Major-Gen. R. M. Ruck, R.E., and the Secretary.

A letter from the Duke of Argyll suggesting that the Club should encourage the invention of some means of minimising aviation accidents was read and its consideration was deferred.

It was decided to issue notices to all Flying Grounds:—

1. Soliciting the co-operation of aviators in preventing dangerous flying, and
2. Arranging for systematical reports by experts on all accidents.

It was decided to appoint Club Officials at the various centres to inquire into and report on all accidents, and the Committee will be glad to receive offers of assistance from experts and those with technical knowledge, who need not necessarily be members of the Club. A list of the Club Officials appointed will be published at an early date.

The Committee considered the drawing up of a series of questions relating to accidents; particulars of these questions will be issued as early as possible.

The Committee will meet on Tuesday, the 21st inst., when full reports of recent accidents in this country will be dealt with.

Competitions Committee.

A meeting of the Competitions Committee was held on Tuesday, the 7th inst., when there were present:—Col. H. C. L. Holden, C.B., F.R.S. (in the Chair), Mr. G. B. Cockburn, Capt. A. E. Davidson, R.E., Prof. A. K. Huntington, Major F. Lindsay Lloyd, Mr. N. C. Neill, Mr. Alec Ogilvie, Mr. Mervyn O'Gorman, and the Secretary.

The question of passing in races confined to Flying Grounds was under discussion. Mr. G. Hamel attended before the Committee and explained his views. It was decided to have a further meeting on the 14th inst., at which several prominent aviators will be invited to attend and assist the Committee.

Presentations to Library.

Sir David Salomons has very kindly presented to the Library a copy of "La Minerve, Vaisseau Aérien," by Robertson, first published in 1804.

Mr. Patrick Y. Alexander has very kindly presented to the Library a copy of "The Structure of the Atmosphere in Clear Weather," by C. J. P. Cave, M.A., and also a copy of "Forecasting Weather," by Dr. W. N. Shaw, F.R.S., Sc.D.

Dover Aero Club.

The Dover Aero Club is now associated with the Royal Aero Club. This Club has its own Flying Ground at Whitfield, about two miles outside Dover; the ground affords an excellent alighting place for cross-Channel flights. There are already two excellent sheds erected, and full particulars as to rents, &c., can be obtained from the Secretary, Capt. W. P. Marley, 11, Marine Parade, Dover.

166, Piccadilly.

HAROLD E. PERRIN, Secretary.

E. H. EWEN'S CROSS-CHANNEL FLIGHT.

TIMES were when aeroplanes, to be supplied from the Continent and delivered in London, were stowed in mammoth cases and conveyed by train, by boat, and by horse vehicle to their destination, very often getting most unaccountably lost or bent in the process. Nowadays, when quick and sure delivery is required, it is nothing out of the way to fly them over to their very hangar's door. Ewen's flight on his newly acquired Caudron monoplane from Crottoy to Chatham was an illustration of this, although unfortunately he was prevented from completing the flight by a black fog. It was for no cross-Channel distinction that he started on his monoplane for London, although, if successful, he knew he would earn it. It was simply that he had bought a machine at Crottoy and wanted to take it to his headquarters at Hendon as quickly as he could and with as little expense as he need incur, that he flew it over.

As for the machine itself, details can be gathered elsewhere in this issue. The machine was not completed until Wednesday last, and as soon as it had left the works, and had been tested in flight by M. Rene Caudron, Ewen installed himself in the pilot's seat to see what he could do on his new mount. Two practice flights he made on Wednesday, and a third on Thursday morning, during which trips he had accumulated sufficient confidence in its control to decide attempting the trip to London. Two and a-half hours before the start, M. Rene Caudron and Ewen's friend Ramsay set off in the former's car for Cap Grisnez, where Ewen had arranged to land preparatory to making across the Channel. During the necessary wait before the commencement of the flight, Ewen assures us he was most cordially entertained by the military pilots stationed at the Caudron school.

At 9.32, notwithstanding that the wind was registering 22 miles per hour and showing prospects of increasing, with a slight mist driving up, he rose from the Crottoy aerodrome, quickly mounting to 2,000 ft. and got well away in the direction of Calais. With a following wind at that velocity, and with a machine whose natural flying speed is something over 80 miles an hour, Boulogne was very quickly reached. Here his real difficulties began, for as soon as the town hove in sight, fog banks were encountered, and as meanwhile he was being tossed about by the wind in none too comfortable a

fashion, he confesses to having rather undesirable recollections of that period of the trip. Some time later, figuring that he should be near the point at which he had decided to land, he came down to about 300 feet. Here it was clear and he found himself over the sea with the semaphore station and the formidable cliffs of Cap Grisnez beneath him. The curious air currents they set up gave him trouble, and after a busy minute or two he landed safely at 10.5, having covered some fifty miles in 33 minutes. Ewen's opinion of Cap Grisnez as a landing place, an opinion that will undoubtedly be useful to those pilots intending passing in that direction, is that it is unsafe to approach in anything of a wind at a less altitude than 2,000 feet. However, he was afforded a good reception, for it was the first time that an aeroplane had landed at that particular spot, although naturally many machines had passed overhead. He met his friends and had lunch with them. Towards half-past three the atmosphere cleared sufficiently to render the sea visible for some eight miles, and, hearing from Dover that the English coast was similarly fairly clear, a restart was decided upon. At 5.30 he took the machine up to 3,500 ft., and passed over the semaphore station in the Dover direction. Mid-channel reached, he ran into thick fog, and at the worst possible moment, his compass, borrowed in France, began "doing circles." Continuing on, the fog cleared somewhat, and he realised he was driving right out of his course, for the sun, instead of being to his left hand, was directly behind him. He changed his course and continued on, but it was some considerable time before he had the relief of sighting the English coast. The coast was struck a mile or two to the east of Dover, and being caught in a heavy gust and having his map blow away, he had to land where he fortunately recovered the precious document. It was then getting too late in the evening to proceed, so a halt had to be called. Next morning a start was made under bad conditions at 6.30, and Chatham reached with little incident three-quarters of an hour later. Here rain, wind, and a black fog conspired together to bring the flight to an end, and as Ewen wanted the machine for Saturday's competitions at Hendon, and could not afford to wait the whim of the weather to complete the trip, he had to commit it to the care of the railway authorities.

AIR EDDIES.

MANY of our British pilots have told me how they admire the lines of the new Harriot monoplane, and how they would like an opportunity of flying it. Mr. S. V. Sippe, back from experimenting with Commander Swann's hydro-biplane at Barrow, has, however, had all the luck so far, for on Monday last he left London for Rheims where he is going to try his hand on this most promising monoplane.

Quite a strange coincidence! Just when Ewen, after flying across the Channel on his Caudron monoplane, reached land again, a terrific gust caught him and blew his map, which he had in his hand, away. He continued on for a minute or two, and then, failing to recognise the railway track or the high road that would lead him Londonwards, he chose a likely looking field, circled round it twice, and landed. He waited a moment or two, still sitting in the pilot's seat, watching a group of two or three people who were running to meet him. Something lying on the ground about ten yards away in their direction caught his eye. He left his seat and picked it up. It was his map.

By the way, it is rather interesting to recall that although Anzani motors have done excellent work elsewhere, they have not figured as much as would have been expected, considering that the first cross-Channel flight was accomplished with an engine of this make, in cross-Channel honours. Since Louis Blériot's historical flight, an Anzani motor had not served for a Channel crossing until Ewen brought over the little Caudron monoplane on Thursday of last week. The engine that he used was, curiously enough, the first of a new type—a 45-h.p. six-cylinder radial engine—that the works are now turning out. By its performance it looks like being a very popular engine too.

A rather funny thing happened at Hendon the other day. A military correspondent of one of our big dailies made arrangements to have a passenger flight in order to get a first-hand experience of the use of an aeroplane for observation purposes. He was given a most suitable flight, quite high and quite long, in fact he went all round the Welsh Harp waters and over the Edgware Road, where he could observe to his heart's content. When the flight concluded by a, to him, most breathless *vol plané*, his first words were, "Ye gods, wasn't it cold up there. But where the deuce have we been?"

I hinted some time since that before long we should see Renaux flying over here. But he has not yet come, and I am beginning to wonder if the fact that he has been pulling in on an average £200 a day from hydro-aero passengers, has influenced him in delaying his visit.

Up to the present no fewer than 81 officers of His Majesty's forces have qualified for their tickets. In this connection the Bristol School have a perfect right to feel very pleased with themselves, for they have graduated no less than 50 of this number.

Second May Meeting at Hendon.

TO-DAY (Saturday) at the London Aerodrome, Hendon, commencing at 3.30 p.m., a fine programme is to be got through. Whatever the weather, visitors are not likely to be disappointed under present conditions of flying. There are always pilots not only ready to give an exhibition of skilful control, but anxious to demonstrate the reliability of up-to-date machines. A Cross-country Team Handicap, an Altitude Contest, and a Grand Speed Handicap are the "set" items for the day, but with decent climatic conditions the air throughout the afternoon is hardly ever clear of one or more machines. Mr. Grahame-White deserves well of the public for having instituted this illuminating series of flight meetings at the London Aerodrome which is so convenient to the metropolis.

Windermere's "Water Hen."

ON May 3rd, The Lakes Flying Co.'s new machine, the "Water Hen," was flying very successfully. Of the seven trips it took, the shortest must have been a couple of miles, and the longest well over ten miles. Five times a passenger accompanied the pilot. The lake was quite calm and the machine never once failed to rise at the first attempt with the greatest ease, in spite of the increased weight. No hitch or breakage of any kind occurred.

The Royal Flying Corps are going under canvas on Wednesday next, the 15th, at Lark Hill, on Salisbury Plain, before taking up their abode at their new headquarters at Upavon. These will be ready, I am told, in about seven weeks' time.

Mr. George M. Dyott has gone back to America—he sailed on Thursday last—undecided as to whether he will buy a two-seater Deperdussin or a two-seater Caudron. He would undoubtedly have remained longer on this side of the Atlantic had it not been for the clamourings of some fifteen of his pupils, who are waiting him out yonder to be taught the gentle art.

That an aeroplane should come into use for deporting an exile is an application of the heavier-than-air machine that—and no wonder—has hitherto escaped me. Yet such is the case, and in all probability the exile will have flown, in two senses, from France to this country by the time you read these few lines. Nardini, an Italian flyer of the Deperdussin monoplane, who has done most of his flying in France, is the one who has incurred the displeasure of the French Government, and, being ordered to quit the country, he intends doing so and coming over to England by the airway on his monoplane.

Exactly what he has been doing to get into official bad books I could not say, but someone who at least ought to be in the know, has assured me that it was because he advised the Italian Government of the probable delivery of certain aeroplanes to the Turkish authorities.

Miss Harriet Quimby, who recently crossed the Channel by aeroplane, is taking back with her to America one of the new 70-h.p. Gnome-Blériots with seats in tandem. Her machine underwent its first flying tests on Monday last at Etampes under the pilotship of Perreyon. Miss Quimby is, by the way, a journalist by profession—she is the dramatic critic of *Leslie's Weekly*, one of the greatest of America's weeklies.

There are vague rumours about that Lincoln Beachey, the well-known American Curtiss pilot, is down south, at Pau, learning to operate a Blériot monoplane.

Throwing rice and old shoes at a newly-married couple from an aeroplane is a stunt, the origin of which one should naturally attribute to some American brain. And quite appropriate too, for the fortunate husband was Lee Hammond, a well-known American pilot. The congratulatory emblems were discharged by Mrs. Beatty, passenger with her husband in a Wright biplane, and Miss Grivia, passenger with Reid, in a similar machine. But aviation loses something through the otherwise happy union. Hammond has promised to give up flying.

"OISEAU BLEU."

A Handicap at Brooklands on Whit Monday.

IN connection with the motor car race meeting at Brooklands on Whit Monday, the 27th inst., the Brooklands Automobile Racing Club announce that a cross-country handicap for aeroplanes will be held. The distance will be about 10 miles, and the entries close on May 15th. Prizes are, £75 to the winner, £30 to the second, and £15 for the third, or cups may be taken at the option of the successful competitors.

A New Green Engine.

EMBODYING as it does a number of refinements and improvements suggested by the experience of the last twelve months, the new All-British 100-h.p. Green engine with six cylinders will without question arouse keen interest when it makes its public debut.

The Month's Work in the Bristol Schools.

USEFUL work was done at the Bristol Schools at Brooklands and Salisbury Plain, and the whole of the ten pupils who qualified for Royal Aero Club Certificates were officers in H.M. Forces. Among them was Sir Alexander Bannerman, Commander Schwann, R.N., and Capt. Broke-Smith, R.E. From statistics compiled it appears that 579 flights were made during the month at the schools, giving an aggregate of 3,590 miles flown, a record which it is doubtful if many continental schools can equal.

THE "LOW" ENGINE.

A REMARKABLE LIGHT-WEIGHT PETROL MOTOR FOR AEROPLANES AND CARS.

By the INVENTOR.

It is not a very easy thing to describe any really new engine, for everyone at once pictures some slight alteration in valve gear, an extra neat construction, or other detail alteration.

The engine is absolutely different from any other, though its method of working is not unlike the Diesel. In this comparison, however, there are two vital exceptions, namely, waste heat is utilised, and no pumping-gear has to be worked by the engine itself. The principle upon which the "Low" engine is based, is the utilisation of waste heat, and is identical with that of the coal engine, which was described in the technical Press about a year ago, and which further tests have shown successful.

The best way to understand this engine is to imagine an ordinary car engine with a very high compression, and with the water-jacket full of petrol. The engine is first run in an ordinary manner, the liquid petrol being sucked through a valve in the head. As soon as the engine gets hot, the compression is increased to its full amount by fully dropping the exhaust-valve, and the jacket has by this time become full of petrol vapour under a high pressure.

On the suction-stroke the piston draws pure air into the cylinder, which is compressed to above 500 lbs. per square inch. At the top of

can only be accomplished by admitting the petrol gradually so as to maintain the pressure during most of the stroke. To allow for this an ordinary sparking-plug is used close to the point where the petrol vapour enters, and the spark is allowed to take place during the whole of the firing stroke.

It is interesting to note that, whereas at ordinary pressures the old theory of stratification has been found to be mainly false—where the pressures are in the neighbourhood of 300 lbs. per sq. in. and over the effect is very noticeable, and it is this that causes the petrol to burn more or less locally in the compressed air as it is injected, giving a slow, steady rise of "explosion" pressure.

On this experimental engine timing is obtained by varying the depth of the trip-valve plunger. This has been found a quite unnecessary arrangement, but for an engine that has to run at one speed it is satisfactory, as is proved by the fact that while it renders an engine very untractable it has been possible to obtain 18-h.p. at 3,400 r.p.m. from this little engine, with a cubic capacity of less than 400 c.c.

Naturally, it is not possible to give very complete details of the valve and its arrangement, or of the special petrol-pump used, as these will form the matter of separate patents. The future design of this engine is not without interest. It is not desirable to jacket the whole of the cylinder; we are, of course, speaking of air-cooled engines, though the principle applies exactly the same to water-cooling; and in future engines, which are to be built for the purpose of developing the system, the head only will be jacketed, keeping it cool, and providing ample evaporating service. The petrol vapour will be admitted to the cylinder by means of an oscillating inlet-valve, and the moment of ignition will be variable, just as the spark in an ordinary engine, the place of the throttle being taken by controlling the exhaust of the vapour-pump.

It must be emphasised that this pump is only being used as a convenient control, and for getting the liquid petrol into the jacket. In the present engine the trip-valve has been found to be quite reliable, but it makes the engine difficult to control except by lifting the exhaust, as the engine, of course, runs synchronously with the petrol-pump, which vibrates up and down very much in the manner of a Worthington pump.

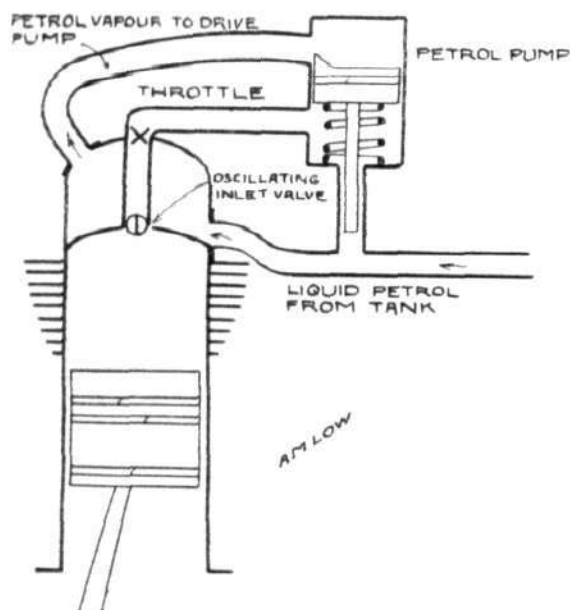
There is no need to go into a longer description of the present engine, but it is interesting to see what are its possibilities. This little engine of the c.c. ordinarily fitted to a light-weight motor bicycle has been reduced to a fuel consumption of 46 pts. per b.h.p. hour, and this with a valve-gear which is extremely inefficient. It develops 18-h.p. as nearly as possible at 3,400 revolutions, it does not run with great vibration, and no special precautions were taken with its construction. It must be admitted that several slight accidents took place, as was only to be expected during any experimental work. The great point which has to be remembered is that the engine works well, and that it is not merely a much-talked-of design on paper.

For motor cycles a small twin with a bore and stroke of, perhaps, one or two inches respectively, should be sufficiently powerful for ordinary purposes. Cars could be built with enormously powerful engines using no more petrol than the ordinary car of to-day, whilst for commercial work the value of such fuel economy can hardly be over-estimated. Owing to the method of causing the explosion, the average pressure can be maintained during the greater part of the stroke, as the petrol is injected for about 50 per cent. of the power stroke, which makes the engine develop its power at very low speeds.

The Duocar, to which it is at present fitted, has taken two heavy passengers up a gradient of about 1 in 18 at 40 m.p.h. with the engine turning at between 1,500 and 1,600 r.p.m., which will give an idea of the great possibilities of the engine, as with a properly constructed valve-gear and a properly controlled and timed admission the car can be driven almost like a steam car, and it can be started up by merely warming the jacket with a small spirit lamp.

The revolutionary advantages of this system need no exaggeration, but it has been a little amusing to receive so many orders from people who do not seem to realise that new inventions are not developed in a day, and it will probably be quite a year before this system can be entrusted to the general public.

One of the applications which brings out this system more than any other has already been noticed by the War Office authorities, who foresee possibilities of its adaptation to aeroplanes. Engines built in this way would be very light for the power developed, the evaporation of petrol helps to keep them cool, their fuel consumption is low, and owing to the expansive nature that it is possible to give to the explosion they should prove effective in reducing propeller flutter. It would enable aeroplanes to be constructed very



the stroke the petrol vapour is admitted, thus causing the "explosion." The burnt gas is exhausted in the ordinary way.

Having once indicated the method of working it will be obvious that there are several ways of carrying it into effect. The engine which has been successfully run was fitted, for the sake of simplicity, to a small Duocar. Its bore and stroke were 2 ins. and 4 ins. respectively, the engine being built after the manner of an ordinary 60° twin. Each cylinder is jacketed throughout its length and cooling-fins are fitted on the outside. This arrangement was adopted as it was thought necessary to have a considerable volume of petrol vapour available. In the top of the head is a trip-valve held down by a spring; this valve can be altered as regards the periods of its opening by varying the stiffness of the spring, from the outside. It is fed by a coil of steel tubing, which is screwed to its seating after the manner of an automatic inlet-valve pipe. The other end of the steel coil is connected to the exhaust of a pump that is worked by the pressure of evaporated petrol. The pump is used to deliver liquid petrol from the tank to the jacket, where it is vaporised, and then passes via the pump through the steel tubing into the cylinder, by the trip-valve as indicated.

It needs no knowledge to see that this arrangement is a bad one, but it was done in the first engine as it was thought necessary that the petrol should enter the cylinder quickly, and also because of the extreme difficulty of making any gland to stand petrol vapour under high compression. Petrol vapour will even leak through ordinary cast iron unless the grain is particularly close.

Once the engine warms up, no ignition is necessary, but it has been found that if proper combustion is to be obtained without the use of a spark, the petrol must enter the cylinder quickly. Now, the great object is to get an engine which runs smoothly, and this

substantially without reducing their lifting power, and once that is understood there is but little more to say.

Pages could easily be written of the years that were spent working out the problems connected with this engine. Dealing with petrol vapour under high pressure is, to put it mildly, difficult, and at every turn one is met with some fresh problem that gives rise to lengthy experiments. The present engine has been run at its full power for four hours on end, and even then, the next engine built on this principle will be entirely different and greatly improved. The only point which has caused any trouble is that of silencing,

and on the Duocar (or rather "cyclecar"), which will get up to 40 m.p.h. at about $\frac{1}{4}$ of the vapour-pump's full opening, it has caused a sensation on more than one occasion by its unearthly roars. And even now the exhaust gases are led into quite a respectable silencer, perhaps it may prove necessary to sacrifice some of the power for controllability, comfort and reasonable silence. Particulars of further engines will probably be available quite soon, as the engine has been strongly taken up, and it is being rapidly brought to a commercial, that is "fool-proof" condition.

A. M. Low.

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THE STRUCTURE OF MOVING AIR.

By GRIFFITH BREWER.

THE following article is the outcome of a recent informal discussion at the Aeronautical Society, and the author suggests that if any reader of *FLIGHT* could devise a simple means of testing the paths of local eddies and currents, he would do a signal service in the cause of all who are engaged in aerial work. If readers of *FLIGHT* would contribute their personal observations while flying or ballooning, the aggregate information thus collected might lead to some likely method of investigation suggesting itself. The following argument concludes with a suggestion which the author would like others to discuss.

TEN years ago there was a general belief that the air moved in a large unbroken bulk from one locality to another locality. Certainly, the air in its travel was known to move mainly in huge circles or cyclones, the centres of such circles being of low pressure, compared with the outer portions.

Since then, a new school has grown up, which recognises that the air has innumerable eddies and upward and downward trends, and these have been recognised and pointed out in practice by those who have learnt to fly on machines which require to sit on the air in order to sustain themselves. Naturally, when the foundation supporting the man as he travels through the air suddenly gives way at one side or the other, he notices what would otherwise have escaped his attention, and however beautiful a theory of air currents may be, there is nothing like a six foot drop in the atmosphere to impress the effect of a down trend or "pocket" on the observation of the flyer.

The study of eddies and currents that exist in the atmosphere is one of especial interest, inasmuch as being invisible, they can only be located and observed by deduction; besides, the very variety of these disturbances exercises a peculiar fascination on the mind, for they all combine together to make one complete result. There are no gaps or voids to fill in between the various eddies, for they unite together in a similar way to the boiling eddies in the river below the Niagara Falls. There the water can be seen rising from below as though innumerable water taps had been turned on below the surface, and then as they rise up in humps they spread out, not radially as would be expected, but in twists and spirals which unite with other twists and spirals, and hustle each other into waves and whirls.

The first experience that I ever had with upward currents and which drew my attention very forcibly to the subject, was when I was in charge of the Aero Club balloon at the Crystal Palace on the 27th April, 1907, my passengers on that occasion being Lieut. Caufield, the Hon. Claud Brabazon, and Mr. Harold Perrin.

On that day there were thunder clouds about although we had no actual thunder, and after being in the car for nearly an hour in sight of the Crystal Palace, a large upward trend of wind lifted us several thousand feet into the air. The speed of the upward trend may be imagined, when light objects thrown out of the car would rise in the air above the balloon, which itself was rising in the air. This was proof that the upward current was sufficiently strong to carry these small objects swiftly upwards, faster than it could carry the balloon up, because our instruments showed, by decreasing pressure, that although we had a big descending force, yet we were being lifted up by a strong vertical wind.

When the lift ceased at about five thousand feet, we descended in undisturbed air to our original level, and then finding a northerly breeze, we travelled down towards Reigate, and when within four miles of the town, we were again picked up by a violent upward current which carried us up to five thousand feet. During this ascent the neck rope of the balloon was lifted up, and it was as much as we could do to pull the neck down so as to prevent the balloon becoming too much of a parachute, and there was a considerable amount of noise and disturbance with the flapping of the balloon and fabric generally during that upward rise. We wasted a good deal of gas on that ascent, and when we came down we found that we were in a violent wind and we made a somewhat rough landing.

In thinking these vertical currents out afterwards, I came to the conclusion that although we had not experienced any down currents of similar magnitude to the up currents, yet the air could not go up without a similar quantity of air going down, and I thought it was possible that similar down currents existed which, by accident, we had not encountered. In fact, I came to the conclusion that the wind currents might travel in the form of a vertical parallelogram, and that if we had got into the down current, it might have been with disastrous results. Ever since that time, however, although I have

encountered up currents of a less pronounced character, I have never found any down currents of similar speed to the up currents.

This leads me to the conclusion that an up current may be of a very powerful kind in a small area, which is fed not by a similar small area down current, but by a general descent of the main bulk of the air. For instance, if in an area of a thousand acres an up current of one acre sectional area takes place, and it is fed from the whole thousand acres, it follows that the speed and amount of down current, in being distributed over the whole thousand acres area, must be a thousand times less in distance of travel and in speed, than the distance of travel and speed of the up current, which is a thousand times smaller in sectional area.

This may probably be the structure of the majority of up trends of air which become inverted cone-shaped above and cone-shaped below, partly because they must expand as they get into a lesser pressure upwards, and partly because they rotate as they rise.

The commencement of the formation of an up trend of this kind would appear to be brought about by the disturbance in balance of an area of heated air.

Assume that the sun is playing on a ploughed field, which radiates heat to the air adjacent to the ground. Owing to the radiation of heat, the air next to the ground gradually becomes lighter and tends to rise. So long as this tendency to rise is equally distributed over a large area, the air only expands and lifts the volume of air above it; but when this tendency to rise reaches a critical point, the expanding air naturally finds the weakest spot in the bulk of air above it through which it can break, and then a great bubble, as seen in a vessel when water begins to boil, rushes from the bottom, upwards, and the whole pent-up volume of heated expanded air flows in to feed the upward trend caused by the breaking through of the first volume. The rush to the centre is not radial, but in spiral form, and the upward trend takes a spiral form also, and I imagine that when the heated air has passed through the obstructing layer of colder air, it disperses above in a somewhat similar manner to the whirlpool or eddy seen in fast flowing deep water.

It is obvious that upward trends formed in this way can be of almost any size and intensity. How intense they can be is proved by the gigantic masses of water lifted with water spouts, and by heavy objects, such as buildings, being sometimes carried from one place to another.

I have not studied such questions, however, beyond the observations which have come under my personal notice, and I do not know whether water spouts occur only under the influence of a hot sun, or whether they occur at other times.

The vertical current is, perhaps, the best known, but I have no doubt, that if we could see the movement of the air, we should see that some type of horizontal current or eddy is quite as common as that of the vertical type. All of us at some time or other have listened to the howling of a gale, and we all know that the wind comes in gusts with periods of comparative calm in between. Now unless we suppose that the air travels in the manner of a caterpillar by alternately closing itself up and expanding as it goes along, we must agree, that in order to travel in one direction at varying speeds, it must either move in this concertina manner, or there must be some circular or undulating subsidiary motion, contained in the main bulk of wind as it travels in one direction.

These local eddies are, of course, accountable where obstructions on the ground cause such eddies, but even at sea, where there is nothing but the waves to impede the movement of the air, the wind comes in regular lulls and gusts, and sailors wait for a lull in order to take in a sail in the same way that at Battersea Park we wait for a lull in order to get a balloon away.

How can these lulls occur, therefore? Is it by reason of subsidiary cyclones contained in the main cyclone, or by overturns of wind travelling over the country like the wheels of a train?

AERONAUTICAL SOCIETY OF GREAT BRITAIN.

OFFICIAL NOTICES AS SUPPLIED BY THE SECRETARY.

Meeting next Thursday at the Royal United Service Institution, Whitehall, 8.30 p.m. Lecturer, F. H. Bramwell. Chairman, F. Grant Ogilvie, C.B., LL.D. (Director of the Science Museum).

Special General Meeting.—A special general meeting of the Society will be held on May 16th, at 8 p.m., at the Royal United Service Institution, Whitehall, for the purpose of amending Rule 27 in respect to Associate Members, in such form as shall make the subscription to that grade one guinea per annum and the entrance fee nil.

Programme of Meetings.—To be held at the Royal United Service Institution.

May 16th, Thursday, 8.30 p.m. Chairman, F. Grant Ogilvie.

C.B., LL.D. F. H. Bramwell on "National Physical Laboratory Research."

June 12th, Wednesday, 8.30 p.m. G. Holt Thomas on "Hydro-aeroplanes."

Programme for Session 1912-13.—The meetings of 1912-13 Session will be held on second and fourth Wednesdays at the Royal United Service Institution, at 8.30 p.m., beginning October 9th. Additional to the papers already announced are: Lieut. R. Gregory on "Aerial Navigation"; E. H. Harper on "The Theory of Aeroplane Stability."

Election of Members.—The following have been elected members of the Society:—G. P. Ottino and Lieut. C. Randall, R.N.

T. O'B. HUBBARD, Secretary.

METEOROLOGY FOR PILOTS.

In his lecture at the Aeronautical Society on Monday, April 29th, Capt. Ley said that the results of his observations on pilot balloons at Blackpool and Sellack last year showed that, even knowing the surface velocity of the wind and the gradient velocity of the wind, it was difficult to calculate the velocity at any given height without reference to topography owing to the impossibility of saying at what height the gradient-velocity would begin or the steep surface-gradient end.

It was equally difficult without actual preliminary observation to say whether the wind would rotate in a clockwise or counter clockwise direction with increase in altitude.

Both factors depend largely upon the topography of the locality, and so, also, it appears, does the oscillation of the horizontal velocity of the wind. On the open Blackpool coast it was safe to say that nearly the full gradient velocity would probably occur at a height of under 300 ft., whereas at Sellack in Herefordshire it would not probably occur in the lowest 2,500 ft.

As regards the vertical motion of a wind, Capt. Ley applied the accepted theories of convergence of stream lines and collision of currents to the effect of the actual obstacles presented by the hills.

It was seen that the Snowdon and Scafell hill areas were roughly 3,000 ft. in altitude and formed the extreme and controlling points of a large horseshoe-shaped range covered roughly by a 2,000 ft. contour.

Thus in moving across this area we should expect a wind to show changes of horizontal velocity at these heights. Moreover, apart from temperature effects, the effect of obstructions would be both longitudinal and some lateral compression due to deflection, with consequent vertical motion.

The effect was well illustrated by balloons sent up in steady N.E. winds which had blown over the 2,000 ft. range and were moving towards the Snowdon area. These showed violent oscillations of horizontal velocity at about 2,000 and 3,000 ft. altitude, and strong ascending components of velocity with cloud just above 3,000 ft.

Balloons from a westerly direction showed changes at 2,000 ft., with frequent vertical motion commencing or culminating at this altitude.

Summing the results of 1910 and 1911, at Blackpool, it certainly appeared that the levels 1,500-2,000 ft., 3,300-3,500 ft. and 4,800-5,200 ft., were critical levels in the N.W. of England, at which sudden changes in the three directions in space might be expected.

Then, as regards the Wye Valley area, just north of Ross, 800-1,000 ft., 2,000-2,500 ft., 3,300-3,500 ft., and 4,500-5,000 ft. appeared from balloons as critical levels. The lower level was seen

to be roughly that of the ring of low hills, a few miles to the west, the 2,500 ft. level, that of the Black Mountains, and Breconshire range further still to W., the 3,500 ft. level, that of Snowdon range. Nothing appeared, however, to correspond with the 5,000 ft. level.

The effect of frontal obstruction and squeezing into a narrower channel of the surface wind was clearly shown in balloons moving towards the eastern watershed by the throwing up of the wind on a line along the E. bank of the Wye on the ascending slopes and some 2 or 3 miles before the watershed was reached.

This line represented at once the meeting of the downward and upward grazing lines of a westerly wind, the locality of compression due to deflection caused by the projections of the How Caple and Ross hills, and the place where the heated air of the valley is piled up. The result on a hot day, with strong wind, such as July 18th or 21st, 1911, was a startling upthrow of air, preceded by violent horizontal gusts and reaching, apparently, up to 3,500 ft. elevation. These hot days with fairly strong winds must be regarded as dangerous. Some of the lighter winds moving towards steep slopes were deflected almost at right angles and such deflection was preceded by vertical rise.

An analysis of balloons at Limerick, in Ireland and Glossop, in Derbyshire, showed similar results; and it appeared that the 3,000 and 5,000 ft. were rough critical levels over the whole of the W. of England and Ireland, lower levels occurring according to the height of hill ranges in the vicinity of any given locality. The changes at such levels were principally evidenced by sudden change of vertical motion and oscillation of horizontal wind velocity. Ascending motions were reliably measured, as large as 350 ft. per minute, and the descending motions were not infrequently of 200 ft. per minute, though the larger ones did not appear to be more than 200 or 300 ft. thick.

The frequency of cloud at 3,000 and 5,000 feet was remarkable.

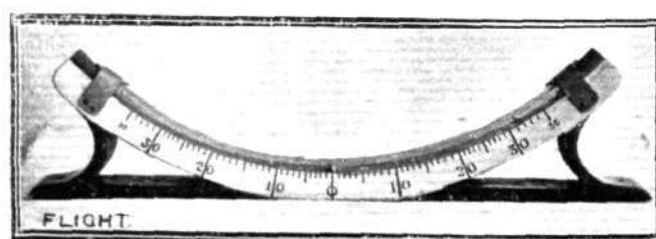
At Blackpool, if low cloud appeared it was fairly safe to estimate its height at one or other of these figures. As it was sometimes easy to measure the velocity of the shadow of a cloud, a careful study of a low cloud would be most valuable to an aviator. He would be able to judge of the height of a critical level and of the velocity of the current just above it.

Of course, as in all other meteorological generalities there were many apparent exceptions, and very many cases in which changes at any altitude were too slight to be observable, nevertheless the tendencies certainly were permanent for any given wind direction in any given locality considered apart from general meteorological conditions.

THE GOUGH-TURNER CLINOMETER.

In the accompanying illustration is seen a device—known as a clinometer—for indicating the inclination to the horizontal of an aeroplane or airship. It is manufactured by H. G. Turner, of Eldon Grove, Manchester, and consists of a curved glass tube containing a non-freezing liquid and an indicator ball. The position of the latter indicates on a graduated scale the exact angle the machine may make at any time. The principal feature of this device lies in the fact that it indicates angles correctly when subjected to vibration.

It has been tested on aeroplanes by Messrs. C. Grahame-White and Co., Ltd., and on airships by E. T. Willows and on H.M. airship "Gamma." It can also be adapted for use on motor cars and submarines, and we understand that a modification of the clinometer is being made, called the banklinometer, for determining the correct angle of banking when making a turn on an aeroplane.



The "Gough-Turner Clinometer"—a device for indicating the inclination made by an aeroplane or airship.

FOREIGN AVIATION NEWS.

The Pekin to Paris Race.

THE regulations governing this event has now been approved by the Aero Club of France and issued. The event will be international as far as the pilots are concerned, but the machines must be built by a French house established in France before January 1st, 1912. The race will be held if there are five entries before June 16th, and these it is said are assured. The start will take place from Pekin on September 1st, and the competitors will be required to pass the official controls on the following dates: Ourga, September 14th; Irkoutsk, September 21st; Omsk, September 28th; Moscow, October 12th; Vienna, October 19th; Genoa, October 25th; Paris, November 1st. The prizes will be 100,000 frs., 25,000 frs., and three of 10,000 frs. each. Should no competitor complete the full distance the one travelling the farthest will receive a prize of 50,000 frs., provided Omsk has been passed.

Various parts of the motor, planes, elevator and rudder will be stamped, and two at least of the marked parts must be in position at the finish. The landing chassis and the propeller will not be marked.

From Issy to Rheims on a Hanriot.

ON the 2nd inst., Frey returned to Rheims on a Hanriot monoplane from Issy. The trip took 2 hours 7 mins., and Frey had to constantly vary his height between 1,500 and 1,800 metres in order to dodge the fog.

Flying Under and Over a Bridge.

AMONG a number of £40 prizes offered two years ago by the Ligue Nationale Aerienne, was one known as the Claudel Prize, to be given to the first aviator who should succeed in flying over and then under the Corneille Suspension Bridge at Rouen. The feat was accomplished on Sunday afternoon by Cavelier on a Deperdussin monoplane. He started from the Bruyeres Aerodrome, flew over the bridge at a good height, and then turning swooped down and passed under it, afterwards returning to his starting point.

Testing Miss Quimby's New Machine.

ON Monday, at Etampes, Perreyon made three splendid test flights with passenger, with the new 70-h.p. Blériot, which Miss Harriet Quimby is taking back to the States.

A 250 kilom. Trip on a Deperdussin.

LIEUT. BRUNCHER on Monday flew on his Deperdussin from Mirecourt to Rheims, a distance of 250 kilom. in 2 hours 27 minutes.

Testing a Batch of Blériots.

A DOZEN single-seater Blériot monoplanes, ordered by a foreign army, were tested on Monday at Etampes by Perreyon. In the altitude tests the machines attained a height of 1,300 metres in 17 mins.

Another Peugeot Prize.

YET another prize for a "flight" by human energy alone has been offered by the Peugeot firm. This time it takes the form of 1,000 francs for the first person who, on a bicycle transferred into a flying apparatus, succeeds in flying across two cords placed 1 metre apart and stretched at a height of 1 decimetre (4 ins.) above the ground. The feat must be accomplished once in each direction, and the total time taken for the two trials must not exceed 10 minutes. This makes 21,000 francs which have been offered by the Peugeot firm. They have previously offered 10,000 francs for a human flight of 10 metres, and another prize of similar value for the longest flight accomplished by muscular power alone.

Fatal Accident to Count de Robillard Cosnac.

AFTER being out and circling over Nice, his native city, nearly every day for some weeks on his monoplane, Count de Robillard Cosnac met his death on Sunday afternoon. As the result of an accident recently, the machine had been fitted with new wings, and the Count said he regretted he had not the old ones, but all the same the machine was in good flying order. He started off on Sunday afternoon with the intention of flying from the California ground to the Hanriot school at Antibes, and when nearing there the machine was seen to be tossed about by the wind and then finally to dive down sideways to the ground, apparently through a wing collapsing. Several motorists who were passing went to the assistance of the aviator, but he had apparently been killed instantly, and the machine was so damaged that it was impossible to really ascertain the cause of the accident.

Long Flights on Farman Machines.

ON his Henry Farman biplane the Greek officer Kamberos on the 3rd inst. flew from Etampes to Champagne-sur-Seine and

returned to Etampes on the following day. On his way back he passed over the Fontainebleau Forest at a height of 1,200 metres. Also on Saturday, Chebillard on a racing H. Farman machine went from Etampes to Buc. On his M. Farman biplane on Sunday Lieut. Grezard made his first test for a military certificate, over a course from St. Cyr to Chartres, Orleans, Etampes and back. On Monday, at Buc, Lieut. Vogoyeau was flying on a Maurice Farman machine for an hour and a-half.

Flying to the Poll.

AT the beginning of the week Monthier on his Borel machine flew over from Amberieu to Bourg, where an election was in progress, in order to record his vote.

Mourmelon to Villacoublay on a Nieuport.

ON Saturday, Gobe on his Gnome-Nieuport machine made a splendid flight from Mourmelon to Villacoublay.



Prince Henry of Prussia 1912 Aviation Prize, modelled by Karl Korschann.

French Army Testing Silenced Motors.

ON the 30th ult., before the Minister of War, Lieut. Migaud and Sapper Bregi, carried out tests at the Mailly Camp, with Salmson-Canton-Unne motors of 80 and 110 h.p., fitted with silencers. In connection with this Bregi has rigged up on his aeroplane an attachment to the exhaust pipe by which he can transmit audible signals to his *confrères* on the ground.

Testing a Caudron Monoplane.

ON the 1st inst., at Crottoy, Rene Caudron was putting the new fast monoplane, built for Mr. W. H. Ewen, through its paces. It is fitted with the first of the new six-cylinder Anzani engines, which during a flight of over an hour gave great results. It was this machine with which Ewen flew the Channel and which we describe this week.

Doings at the Hanriot School.

ON the 30th ult., Marcel Hanriot was flying for an hour at a height of 1,800 metres; and on the 3rd inst., Ponnier made a circuit above Rheims at a height of 800 metres. Lieuts. Menard and Marlin were testing a couple of machines, and made several flights in the strong wind.

A Fast Trip to Mailly.

ON the 3rd inst., Bathiat on his Sommer monoplane, fitted with 70-h.p. Gnome motor, flew from Mourmelon Camp to Mailly and back, a distance of about 120 kiloms., in 40 mins. On the 1st inst., he was testing a couple of similar machines built for the Swedish Army, and was timed to attain a speed of 140 k.p.h.

A Deperdussin in Guatemala.

DURING the early part of April Durafour was at Guatemala with his Deperdussin machine, and made a number of successful flights at a height of about 1,400 metres, upon which he was congratulated by the President. On April 18th he left Guatemala for S. Salvador.

China Takes Up Military Aviation.

WITH the new spirit in China, it is hardly surprising that considerable attention is being given to the subject of aviation. It is understood that a corps of twenty-eight officers, with five biplanes, has been organised at Nankin, but the headquarters are to be transferred to Canton, where there is a more suitable ground.

Rheims to Mailly and Back on a Deperdussin.

MAKING his qualifying flights for a superior certificate, Lieut. Magnin on his Deperdussin, on the 3rd inst. went from Rheims to Mailly Camp and back.

Two Hours' Flight on a R.E.P.

AT Buc, on Saturday last, Granel was flying on his R.E.P. monoplane over a circuit comprising Buc, St. Cyr, Neauphle, Chevreuse, Palaiseau and Buc for two hours. An hour's flight was also made by Lieut. Bruguiere. On Monday, Lieut. Campagne put up a trial of two hours' duration.

Wireless Messages from a Savary Biplane.

DURING a flight made by Frantz on his Savary biplane from Etampes to Chartres on Monday, a wireless operator accompanying

him successfully transmitted messages from the machine to a station 55 kiloms. away. On Saturday, Frantz made a two hours' trip at Chartres, and also took a passenger to Maintenon, returning *via* Dreux.

Fast Climbing on a Sommer Monoplane.

TESTING a 70-h.p. Gnome-Sommer monoplane at Mourmelon on Saturday, Bathiat is said to have mounted 300 metres in 1 minute 35 seconds.

An Hour's Trip on Train Monoplane.

SOME good flights have been made recently by some of the pupils at the Train Military School at Mourmelon. On Saturday last Lieut. Levassor was flying for over an hour. Testing one of his military-type monoplane Train was timed to climb 1,000 metres in 12 minutes.

A Promising Voisin Pilot.

FOR his first cross-country trip, Grasset, a non-commissioned officer, who is being instructed at the Voisin Military School at Mourmelon, went from Mourmelon to Rheims and Charleville, eventually arriving back at a height of 1,500 metres.

The New Ladougue Machine.

TESTING the new monoplane built by Ladougue, Divetaïn on Monday made a trip from Juvisy to Etampes and back, and afterwards went to Buc and back, the machine showing a good turn of speed, in spite of the rain.

Speed Prize for Grand Prix Race.

CONSIDERABLE dissatisfaction having been expressed at the bonus allowances for passenger carrying in the Grand Prix race the Aero Club of France, has now officially announced the offer of a special prize of 20,000 francs, to be awarded to the competitor, who makes the best speed over the full course, without regard to whether passengers are carried or not.

Flying Round Paris.

ON the evening of the 1st inst., Helen, on his Nieuport, succeeded in beating Tabuteau's time by the requisite 10 per cent. for the 200 kilom. trip round Paris, and so he became second holder of the Deutsch prize. His time for the trip from St. Germain to Senlis, Meaux, Melun, and so back to St. Germain was 1h. 36m. 43s., the speed working out to 126 k.p.h. Tabuteau's speed was 112 k.p.h., while Helen on his first attempt averaged 121 k.p.h. In order to secure the cup, the next competitor must attain a speed of 138.6 k.p.h., so that Helen is not likely to lose it for a bit.

Farman School at Buc in April.

DURING the month of April, the pupils and others attached to the Farman School at Buc covered a distance of about 31,250 miles, this including, of course, long cross-country trips to Mailly, Verdun, Toul, Orleans, &c. During the month, twelve pupils qualified for their certificates, and seven others made the required tests for the superior military certificates. During the month too, one dozen Maurice Farman biplanes were delivered.

Vedrines Getting Better.

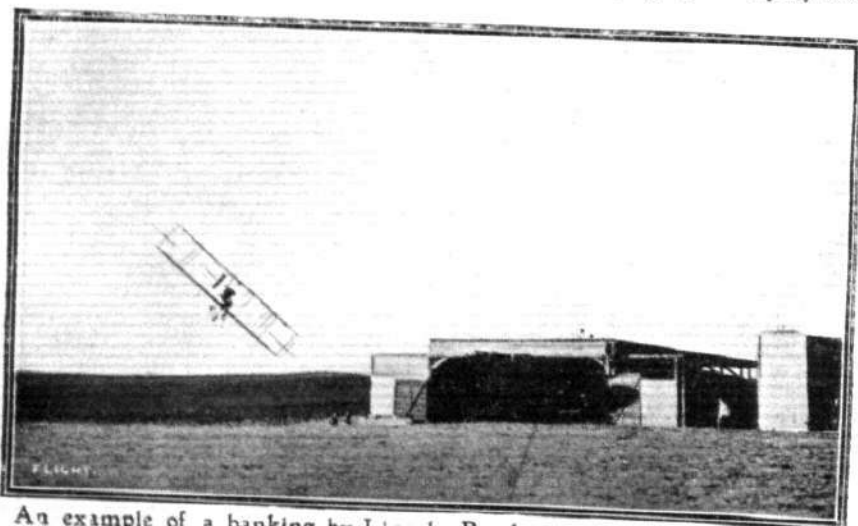
THE latest news of Vedrines is that he is recovering as rapidly as can be expected. On the 2nd inst., he was visited by Col. Hirschauer, who in the name of the Minister of War handed him the Cross of the Legion of Honour, and on Saturday afternoon in the course of a three-minute journalistic interview, Vedrines said he had no recollection of his fall, although he remembered looking out for a landing place. He did not even know where the accident occurred.

Two Fatalities at Johannisthal.

ON the evening of the 1st inst., Hoeffli fell from a height of about 100 ft. at Johannisthal and sustained such injuries that he died the following morning. A second fatality occurred in the early morning of the 7th inst., when a pupil, Pachmeyer, fell with his machine from a height of about 70 ft. and was killed on the spot.

A Flying Week at Johannisthal.

THE Johannisthal flying week is fixed for the last week in this month, when prizes to the value of £2,000 will be offered. The events, like nearly all the other competitions announced in Germany, will only be open to German aviators, except in a few instances, when a stranger who has been resident in Germany for six months, and is employed



An example of a banking by Lincoln Beachey at Los Angeles not to be imitated. With this sort of circus performance it is hardly surprising to hear of so many sudden deaths from America.

by a German firm, may be allowed to compete. The Emperor's Cup will be awarded to the aviator who attains the greatest height.

Work at Johannisthal during April.

FLYING was possible at Johannisthal on 26 days in April, and the 87 aviators made 1,600 flights between them, the aggregate flying time being 211 hrs. 35 min. Kruger, the one-time chauffeur of the Emperor, headed the list with 197 flights, totalling to 18 hrs. 25 mins. During the month, 23 pupils, including 16 officers, qualified for their certificates.

Leonardo da Vinci's Theory of Flight

WAS reproduced from his writings by Dr. H. Donalies in the *Deutscher Luftfahrer Zeitschrift* for January 10th and 24th last. Few of those who have feasted their eyes on the painter's masterpiece on the refectory wall at the Convent of Santa Maria delle Grazie will have realised the universal genius of the master who was an engineer, anatomist, explorer, inventor, sculptor and mathematician of no mean repute. And it is interesting to see how he analyses the motions of birds which by the rapidity of their action have baffled the inventor and imitator till instantaneous photography and cinematography have enabled us to study all the gradual stages at our leisure.

Another Royal Aviator.

PRINCE AXEL of Denmark, a nephew of Queen Alexandra and an officer in the Danish Navy, was taken for a flight in a navy biplane on the 1st inst., by Svendsen. He is said to have been so impressed by his experience that he is wishful of qualifying as a pilot. Anyway he is contemplating going in for a course of training.

A Long Flight in Belgium.

ALTHOUGH it was very cold and there was a strong wind, Crombez on his Deperdussin monoplane on the 4th inst., started from Genck near Hasselt, and flew to Nieuport-les-Bains, covering the 240 kilom. in 2 hours 10 mins., his altitude averaging about a thousand metres.

Fatal Accident in Belgium.

WHILE making a trial flight on his biplane at the St. Job flying ground near Antwerp on Sunday evening, the Belgian, Olbrechts, had a fall from a height of about 50 metres. He sustained very severe injuries, from which he succumbed on Monday morning in hospital at Antwerp.

The Italian National Fund.

AT the beginning of the week the Italian National Fund for the purchase of military areoplanes amounted to about £47,000. The Countess Lina Asparra has started a children's fund for the purchase of a machine which should be known as the areoplane of the children of Italy.

An Aviatress Attacked in Russia.

FROM Riga comes a peculiar story of an outrage upon an aviatress named Galanschikee. It is reported that some malevolent person threw a piece of wood, which struck the pilot, causing her to lose control of the machine, in consequence of which it crashed to the ground, and was smashed, the aviatress receiving injuries which ended fatally.

Ae.C.A. Urges Congress to Consider Aviation.

THE Board of Governors of the Aero Club of America has passed a resolution in the following terms, which has been sent to members of the Senate and the House Committees on military affairs:—

"That the Board of Governors of the Aero Club of America, being of opinion that it is of the utmost importance to the welfare of our country that a suitable measure should be promptly adopted, urges upon Congress the passage of such legislation during its present session."

Accompanying the resolution was a message pointing out that although the armies of France, England, Germany, Russia, Italy, Austria, and Japan have been increased by officers, men, and material adequate to take suitable advantage of the application of aviation to the science of war, the U.S. Army remains inadequately provided for, notwithstanding the representations of the military authorities.

Flying to Police Court in U.S.A.

G. W. BEATTY and another aviator flew on their aeroplanes from Nassau Boulevard to the Mineola Court House on April 10th, to answer a charge of exceeding the speed limit when driving a motor car. Beatty pleaded guilty, and said he had forgotten for

the moment he was on earth and thought he was flying! He had to pay 10 dollars just the same, and Beatty then invited the judge to visit the flying ground to make a flight with him but the offer was declined.

Six on a Wright Biplane.

DURING the middle of April G. W. Beatty made a great many flights with passengers at the Nassau Boulevard, and on April 20th he took five of his friends for a four-mile trip on his Wright biplane, the total weight of the six persons being 846 pounds.

Overtaking a Liner by Aeroplane.

HAVING recovered from the effects of the taxicab accident in which he was involved recently, Frank Coffyn, on Thursday of last week, carried a newspaper representative on his Burgess-Wright aquaplane from New York, and overtook the outgoing steamer "Ancona," bound for Naples. The steamer was caught up at Tomkinsville, Staten Island, and as Coffyn's passenger had a message for the captain, she stopped, and the aviator brought down his machine to rest alongside, a boat was lowered and took the messenger to the liner, from which he afterwards returned ashore on board a tug.

More Parachute Jumping from Areoplanes.

AT Marblehead, Mass., on the 13th ult., F. Rodman Law by the aid of a parachute dropped a distance of 1,200 ft. from a Burgess hydro-aeroplane piloted by P. W. Page. The parachutist fell in the waters of the harbour, and he was rescued by a motor boat. About 35,000 people gathered to watch the performance.



AIRSHIP NEWS.

A New Clement-Bayard Airship.

ON the 1st inst. the first trial was made with the latest "Clement-Bayard V" airship. It follows the general lines of its predecessor, the envelope having a capacity of 9,000 cubic metres, while the car is fitted with two 125-h.p. Clement-Bayard motors, and the two gear-driven 6-metres Chauvière propellers which they drive are expected to give the airship a speed of 55 k.p.h. The airship was out for an hour on the 1st inst. with six persons on board, and on the following morning was out for an hour-and-a-quarter, during which it cruised over the country around La Motte Brueil.

Tests With the Siemens-Schuckert Airship.

ON the morning of the 2nd inst., the dirigible "Siemens-Schuckert," left its headquarters at Biesdorf in order that some experiments might be made over Lake Mueggel. The airship alighted on the water the first time all right, but the second time the airship pitched forward and the leading propellers were damaged. The pilot then endeavoured to take the airship back to Biesdorf with the aft propellers, but on arriving back there was a *contretemps*, owing to the landing tackle having become entangled. The airship drifted on into some woods, where it was finally got under control. Subsequently it was taken back to its shed in a considerably damaged condition.

Zeppelin Liners Meet.

ON the 1st inst. the "Schwaben" left Baden-Baden at 8.20 and passed Carlsruhe at 9.15, Heidelberg at 10.10, Mannheim at 10.20, and Frankfurt at 11.30. Here she met the "Victoria-Louise," which had left Frankfurt at 11 o'clock for her usual daily trip. The latter continued its journey, while the "Schwaben" landed for three hours. Starting again at 3 o'clock, she passed Wiesbaden at 3.50, followed the Rhine Valley past Mayence, Bingen, Coblenz, and Bonn to Cologne. She then went on to Dusseldorf, arriving there at 6.30.

The Airship Manœuvres at Cologne.

THE Airship Manœuvres at Cologne started on the 1st inst., but they were somewhat disappointing, as the only airship present was the "Z 11," which in the early morning went to Margenich and back, and later sailed up the Rhine to Neuwied. The next day she made three ascents, but they were confined to cruising over the town and fortifications. The other two dirigibles, "M 111" and "P 11," are at Berlin and Bitterfeld respectively.

Mishap with "Parseval III."

WHILE going from Tegel to Juterbog Camp, on the 3rd inst., the military dirigible "Parseval III" was overtaken by a storm of wind and rain, and the pilot, in order to save the airship, had to pull the ripping panel.

THE AERO ENGINE.

By G. H. CHALLENGER.

WHILST some readers may think that the following article, dealing exclusively with the internal combustion engine, is not suitable for publication in a journal devoted to aviation, a little consideration will show that on any machine which will fly, the motor is the most important detail. If a machine can make a continued series of short flights without regulation or adjustments in the intervals, it can fly for as long a period as the motor can develop the necessary power, the duration of the flight being solely limited by the supply of fuel and the stamina of the aviator. This article deals mainly with the question of air-cooled motors, but may be equally useful in connection with water-cooling systems, because anything which tends to decrease the heating of air-cooled cylinders will decrease the weight of the water-cooling plant where such is used.

It has been written mainly for the large section of aviators who do not profess to know much about the principles of the working of their motors, but who have had some little experience in their use. It is not severely technical, and simple examples and explanations are used throughout. The article will have served its purpose if the class of aviators mentioned is enabled through it to gain confidence in the staying power of the motors and so put up some consistently good cross-country flights.

Air Cooling.—One is naturally biased against the air-cooled motor by the fact that, in this country at least, there is no automobile in existence on which an air cooled system has been satisfactorily applied. It will be useful to consider briefly the conditions under which the automobile engine works. It rarely works under the same set of conditions for any length of time, but is called upon to develop varying powers at varying speeds from the maximum to the minimum of either. In order to save the driver from the necessity of constant manipulation of the air, gas and ignition levers to suit the ever varying conditions, it is now usual practice to fit an automatic carburettor which will approximately give the best mixture to suit the varying demands made on the engine. With the almost universal adoption of the magneto, the practice of fixing the ignition is becoming standard. For reasons which will be given later, a fixed magneto ignition closely approximates to the requirements of the engine. The engine control is simplified to one lever operating the throttle, thus considerably lessening the amount of attention required from the driver.

Control.—For those whose sole delight in motoring lies in rapid motion and in getting the last ounce of power out of their engines, this simplification is irritating, because three or more control levers give more scope to the imagination than one. It is freely admitted that better results can be obtained with independent control of air, gas and ignition, but unless the driver has considerable knowledge of the working of an internal combustion engine, the results will be inferior to those given by the automatic arrangement. The average driver prefers the simpler control which leaves his attention more free for the enjoyment of scenery or the negotiation of traffic. Motoring has gained its present popularity as a means to an end and not as the end. The average motorist would find it very dull pleasure spinning round and round Brooklands track day after day. The people who keep the motor manufacturers going prefer the automatic carburettor.

Automatic Carburettor.—Let us then examine the automatic carburettor for which purpose a definite test case will be useful. A test made with a 4-cylinder 90 × 120 car under normal conditions of driving, over a period of 2 hrs. 55 mins., including town work with traffic stops and calls with some clear running on suburban roads. This test being made in a hilly town demanded continuously the fullest variations of speeds and powers of which the engine was capable. The consumption worked out at 22.9 miles per gallon. The car was afterwards run three times over a certain country route, each time a definite speed was maintained by a Stewart speedometer with following results:—

| | | | |
|---|-----------|-----------------------|-------------|
| 1st. | 15 m.p.h. | showed consumption of | 29.8 m.p.g. |
| 2nd. | 20 | " | 31.4 " |
| 3rd. | 25 | " | 26.3 " |
| Engine running idle at about 700 r.p.m. consumed 0.43 gals. per hour. | | | |
| " | " | 300 | 0.39 " |

This carburettor was designed to give easy starting with good average consumption combined with great flexibility—in fact on level road the speed on top gear could be varied from 4 to 40 miles per hour by manipulation of one lever only. It replaced another automatic carburettor which gave only 18 miles per gallon in ordinary town work, and its design was really the outcome of tests on the latter.

One test showed that when running all out at 40 m.p.h. there

was a suction on the jet equal to a column of water sixteen inches high. Extra air was gradually admitted into the induction pipe above the jet until the suction fell to eleven inches *without any loss of speed.*

This point has been emphasized because any excess of petrol over and above that required for the correct mixture only goes to heat up the circulating water and exhaust and even occasions a loss of power. For figures of actual tests see Table I.

Thermo-Syphon Cooling.—The same engine which had a copious supply of circulating water on the thermo-syphon system would boil the water furiously when nearing the top of a steep gradient, of about one and a-half miles in length, on first speed. It was called upon to develop high power with a low car speed so that the radiator did not get the advantage of a good blast of air.

In many cases where engines are fitted with pump circulation and a fan behind the radiator—more especially on heavy commercial vehicles—the water will keep cool when ascending hills on first speed, but when the gradient slacks off and second speed is taken early the decreased speed of fan and circulating pump immediately results in the boiling of circulating water, until the engine is able to speed up.

A simple system of air cooling would obviously be impossible under the two latter conditions. It has been seen that under normal conditions the automatic carburettor does not give the best mixture for every condition of varying demand, but only an average good result. The water-cooling system as fitted to automobiles with its usual large reserve of cooling power is able to cope with the heating due to excess of petrol inseparable from the use of automatic carburettors under some conditions. It will be noticed from the two cases given that there are automatic carburettors and automatic carburettors. The perfect automatic carburettor if made would probably never be used because many delicate refinements which result in increased economy must give place to simplicity with its slightly reduced economy and freedom from liability to breakdown and derangement. But even supposing perfect carburation, a simple air-cooling system would fail when high engine powers are demanded at low car speeds.

Power and Speed.—In the aeroplane the conditions are not exacting in the matter of demand for sudden and large variations in engine power and speed, so that it should be a much simpler problem to secure the highest thermal efficiency, *i.e.*, minimum petrol consumption and heating of cylinder walls and exhaust. Again, the aeroplane has of necessity to move at a high speed in order to maintain itself in the air, so that a good blast is always available. Having seen that the conditions are favourable to air-cooling, what are its advantages?

Many private car owners, to say nothing of engineers in charge of motor bus and cab undertakings, who get all the troubles and none of the joys of motoring, would be pleased to scrap their radiators, pipes, pumps, water connections, &c., with their attendant troubles if a satisfactory and simple air-cooling system could be demonstrated to them.

Weight and Air-Cooling.—Most aviators using water-cooling systems would do the same with their outfit, for in order to cut weight, their water-jackets, pipes and radiators are cut down to minimum size and thicknesses, so that they are a prey to fine vibration in spite of the multiplicity of rubber water joints which are found to be absolutely necessary. For equal weights of power plants—provided that the power and durability could be maintained—air-cooling would win if put to the vote. If the air-cooled power plant was the lighter of the two it would be chosen, even if it had to be weighted up with lead to bring it up to water-cooled weight for handicapping purposes. This will be admitted by the greatest water-cooling enthusiast, if he be a practical man at the same time. Air cooling has its power limitations as will be seen later but theory and practice combined will reduce those limitations.

Radiators.—For some reason one unconsciously omits the weight of radiators, water, &c., when comparing $\frac{HP}{W}$ of the two systems; perhaps it is due to the early innocence of the engine manufacturer's advertising departments, who sometimes even omitted such thing as magnetos and carburettors in the advertised weights of their motors, because they were not manufactured by the engine builders. Things are improving now, but old impressions stick.

All the world's aeroplane records are held by air cooled motors. The truth of this bald statement is rather obscured by the fact that with the exception of the passenger height record, all records are held by the Gnome rotary cylinder engine which puts it in a class by

itself. That this is so, has undoubtedly gone a long way to ensure its success, for it receives an amount of attention and care, generally from specialized mechanics, which only a few aviators dream of giving to motors which resemble more or less the automobile engine, which suffers neglect because it doggedly plugs away and does its best when it badly needs an overhaul.

Oil Consumption.—Nothing has done more to advance aviation than the air-cooled *rotary* motor but now that the question "can man fly" belongs to the limbo of the past, its shortcomings begin to find criticism. The gyroscopic effect, but more particularly the heavy consumption of expensive oil have turned the engineer's attention to the stationary cylinder air-cooled motor with encouraging results. One reason why all the *rotary* air-cooled engines have not consistently given such good results as those which placed the records to its credit will be apparent from the following observations.

Petrol Feed.—Petrol is fed to the jet by gravity without the intervention of a constant level float feed—the regulation being effected by means of a hand-controlled needle-valve. In addition, the carburettor is provided with a throttle valve in the usual manner and a means for varying the air supply, the diminution of which, without manipulation of throttle, incidentally increases the pull on the jet and consequently the flow of petrol.

I have repeatedly noticed many well-known aviators at schools and meetings habitually adjust the petrol supply for different flights by the same definite number of turns on the needle-valve, quite irrespective of the amount of petrol in the tanks, which from full to empty means a difference in head of 70 per cent., or whether it is to be a *solo* or *passenger* flight, whether they want to *mount* or merely maintain horizontal flight. The variation with different pilots has been, on the same machine under similar conditions, between one and a-quarter to two and a-half turns.

It is a common rule to have the machine held back by assistants while the engine is set to give the maximum power which the pilot's ability enables him to get, and although flying conditions are rather different in very few cases when I have been up as passenger have I noticed any further regulation of the motor by the pilot, except short circuiting on the switch or complete shutting off of petrol for a *vol plané*.

Power Margin.—With the exception of a few machines used for pupils' rolling and hopping practice, there are not many which need the maximum power of their motors for normal horizontal flight, so that a good pilot is able to nurse his motor and have some-

thing up his sleeve for extended flights. The full utility of engine nursing is apparent, especially with air-cooled motors, when it is known that within very small limits any excess above that required for maximum power simply goes to heat the cylinder walls, valves and exhaust and in unnecessary burning and carbonizing of lubricating oil and loss of power.

An Engine Test.—The following experiment made on a four-cylinder 16-20-h.p. Daimler engine in the Engineering Laboratory of the Cambridge University will bear out this statement.

TABLE I.

| | | | | | | |
|-----------------------------------|-------|-------|-------|-------|-------|-------|
| Petrol consumption ... | 0'181 | 0'191 | 0'197 | 0'217 | 0'250 | 0'293 |
| Brake load at 43-inch radius-lbs. | 25 | 27'5 | 29'3 | 29'4 | 29'3 | 27 |
| Thermal efficiency ... | 0'244 | 0'252 | 0'261 | 0'238 | 0'204 | 0'162 |

A little consideration of Table I will show how difficult it is to attain maximum thermal efficiency by hand regulation of engine controls, merely gauging the power of the engine by the sound of the exhaust. In the above test the brake load is practically constant for petrol consumptions varying between 0'197 and 0'250 and *slightly more power is given for a consumption of 0'191 than 0'293.*

Fires.—The experience related which will be borne out by the reader's own observation go to show that the average aviator would be better off with an automatic carburettor adjusted on the test bed by means of which he can regulate his engine with one lever instead of a combination of three. A very efficient automatic carburettor over the small range of speed and power required of an aeroplane engine should not be difficult of attainment. It is obvious that with three-lever engine control the best of pilots will err on the side of a rich overheating mixture, especially if he has had the experience of firing back into the carburettor due to too weak a mixture and has had to look after the *vol plané* at the same time that he is juggling with the three levers in trying to retrieve his lost mixture. It is probable that many disastrous fires on aeroplanes have been caused by firing back due to the pilots having weakened their mixtures too much, especially if any leaking petrol has been allowed to accumulate within reach of the flame shot out of the carburettor. At Hendon, during the European Circuit the author saw a hole being drilled in the fuselage of one of the competing machines to run off petrol which had been spilt in filling the tanks.

(To be continued.)

WINDERMERE FROM ABOVE. THE FIRST PASSENGER FLIGHT OVER WINDERMERE.

A Pen Picture by the Passenger.

It was May 3rd. The beautiful outlines of the hills and mountains to the North shone through a pale golden haze with their spring greens and clear greys and russet browns growing clearer as the eye sank to the middle distance, drawn down by the magnet of the lake's waters—always charming in their ever changing moods. An hour ago these same dancing waters had been shining black and smooth as a sheet of glass without a ripple. Seen from the road a little higher up they had given back the reversed loveliness of the landscape like a looking glass. All this is but what we have seen so many times before. But resting idly on the ripples is something the old hills have not seen before. They watched, may be, long ago, men make their first timorous venture from land-journeying to water-journeying. Now they are to see men, after many years, go forward from water to pathways in the air. For the thing rocking on the ripples is a hydro-aeroplane—the new "Water Hen."

She is drawn round to the starting stage. I climb into the passenger's seat—the only awkward part of the whole experience. Mr. Stanley Adams, the pilot slips agilely into the pilot's seat just in front. We look all round—to petrol, lubricant, air-valves, &c.—all seems in order.

"Ready?" "Yes." Then Mr. John Borwick starts the 50-h.p. Gnome by giving the propeller a buzz round. The loud even hum of the seven cylinders commences, and we are off. At first quite slowly—then with rapidly increasing speed we skim the surface of the lake.

The sweet air begins to sing in the wires. All at once we are rising. There is no jerk. One only knows that one is flying by the smoothness and ease of the motion. It seems very rapid. The shining blue and white ripples are being passed so fast—35 to 40 miles an hour. Gradually we get higher. The ripples become smaller, indistinct, and then fade from sight. The view opens out as it does when one ascends a steep hill, only so much more easily, so much more wonderfully. There is a perfect blaze of spring colouring underneath and around. As we rise higher and higher

the fields look like bright and green squares on a chess board—but not so regular. The woods are a motley of every glorious shade of green one can imagine. The lake becomes a pool of liquid silver. The beasts grazing in the sunshine pause a moment to look round, then go on feeding. But the swans and other birds seem restless and a little puzzled.

Beech Hill Hotel has disappeared, Storrs Hall looks tiny. There is no sign of the ferry starting, so on we go past Ramp Holm, and look down on the cluster of islands in Bowness Bay like emeralds set in silver. The fells around Ambleside look nearer and clearer but strangely flat. The folk on a passing steamer wave greetings to us. Two or three small boats stop and the occupants gaze and wave. All show a kindly interest.

The notion can only be compared to sailing over a gentle swell. It is exhilarating, glorious, a sport and pastime for kings. But it is the time and place agreed upon to turn back, and as we circle round Hen Holm the only thought is "What a pity that half the trip is over, half this finest experience of a lifetime is past."

South again we go, all too soon. In an incredibly short time the Hill of Oaks sheds appear—draw abreast—and are left behind. Lakeside lies in a silver haze. We take a little circle towards it—then turn and come down just as gently as we rose. I hear the sound of the water under the float, but am not conscious of any jerk or check to tell me when we have left the soft arms of the kindly air and come to rest supported on the laughing waters—those waters which seem to say, "At last! You silly men have found the joy of living, you have devised a poor imitation of the happy birds. Why did you not do it long ago? Well now we know, don't we? you and we, that the gentle air is even kinder and more joyous than good-old mother earth."

Yes, it is true enough, you laughing waters. Clear of dust, clear of mud, afar from the bumpy roads of life, in the sweet summer air, and watching the shadows fleet over the hills and the feathery woods, let me sail with the birds as free and as blithesome as they.

Models

Conducted by V. E. JOHNSON, M.A.

Power Driven Models.

It is extremely gratifying to find that the prominence which has lately been given in FLIGHT to the above subject is already bearing fruit. Many, if not most of the leading professional aeromodellists are now building or experimenting with such plants, and by the numerous letters that we have received, it is evident that much interest has been aroused, and that there are plenty of enthusiastic amateurs who are now busying themselves with engine driven models. As a correspondent (Mr. R. V. Tivy) says "I think you will agree with me, that the advent of a light power plant will open out a new era in model flying and put the whole science on quite a different basis."

But what the would-be purchaser requires (and quite rightly too) is a proper guarantee that the plant will fulfil certain conditions—in order that the customer may know that if he on his part likewise fulfils other conditions—the building of a model with a certain head resistance, a certain lifting area, a certain weight, &c., then successful flight will follow—not necessarily at the first attempt, or at the second, or even at the third—but when practice and knowledge gained from such practice have made him sufficiently acquainted with the new conditions of things, as exemplified both in his motor and his model. For the benefit of those interested we give the following account of some experiments made by us on Epsom Downs on April 30th.

Experiments on Epsom Downs.

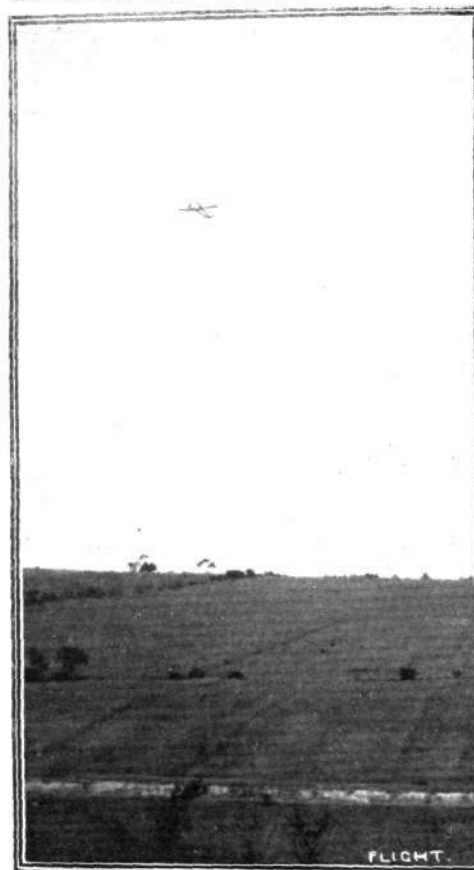
On April 30th, accompanied by Mr. G. P. Bragg-Smith and H. R. Johnson, Junr., we journeyed to the above to try, in actual flight, the steam-driven model illustrated in last week's issue, to which we must ask the reader to refer in order that he may clearly grasp the results which followed. It will be noticed the model has four wheels (two sets of two) in front of the c. g. and a single wheel behind, which latter is not unfrequently replaced by a skid. For all that follows, the wheels forward of the c. g. may be taken as a pair of single wheels. The model was taken to the Downs with the wings detached, and considerable time was occupied in fitting them on and adjusting them, so much so in fact that not very much time was left before darkness began to come on.

Four attempts were made in all—but only three could have given possible flights, as in the other (the last) the lamp was not burning properly owing to the orifice requiring cleaning, and sufficient power was not developed.

In each case the benzoline reservoir was charged with about an ounce of benzoline and the water reservoir with an ounce and a half of water.

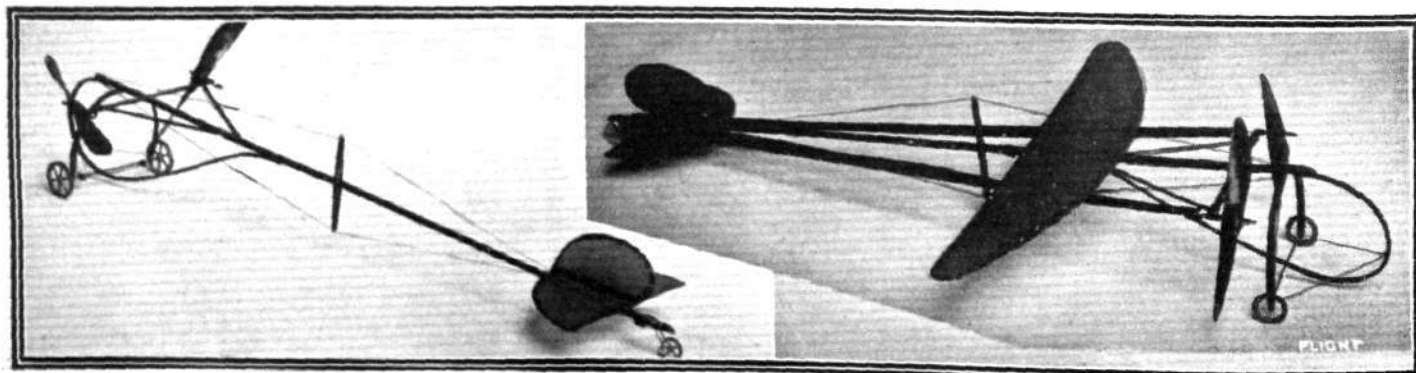
No difficulty was experienced in getting the plant going save that once a valve (rubber tubing) burst (benzoline acts, of course, on rubber), but this was quickly replaced. On starting the motor and allowing the model to take its run along the ground preparatory to rising the result was as follows:—As the model commenced to lift, the front wheels were the first to leave the ground, the model still running on the hind wheel, the torque of the motor (the propeller revolves clockwise as seen from the rear) forthwith upset the model over towards the left (the speed was some 15 to 16 m.p.h.), the left wing tip (provided with a strong steel wire skid) violently struck the ground, the model swung (spun is a more correct word) round towards the left through about a right angle, righted itself, regained

its checked velocity, and the same thing occurred again, and so on several times until the motor had run down. After the first experiment we all fully expected to find the wing tip smashed, but it was not damaged in the least. In the next experiment the wings were warped in order to try and prevent the trouble; the warping was, however, overdone, and this time it was the right wing tip that suffered most. In the third attempt the warp was



HIGH MODEL FLYING IN AUSTRALIA.—Mr. H. P. Wood's 9-oz. model.

lessened slightly, and in this attempt the model nearly succeeded in getting away, but not quite. The fourth attempt was useless, for the reason already stated. The turf was very short, but the ground was decidedly uneven and with plenty of hummocks and nasty dips. There was no wind, consequently the model was compelled to take a fairly good run before anything like soaring speed could be obtained. The way in which the model banged itself about, tearing about in all directions on the ground, was a sight not easily to be



Mr. C. Ian Burrell's improved chassis and protector design for tractor models.

orgotten; in spite of it all, however, there were three things which did not happen. The model did not damage itself in the least; it did not upset, and it did not catch fire. The chassis of the model has now been altered; there is now one wheel in front (on a swivel) and two behind (three in all); the height has been reduced by about an inch and a half, and a new elevator has been made (in case of a smash), and a few other minor alterations and improvements made.

Now although nothing was accomplished in the nature of a free flight, a good many important lessons were learnt. There is first of all the chassis question. We have built several quite successful twin-screw rubber-driven, self-rising models with the two wheels in front and one behind arrangement. In the case of a single-propeller power-driven model, we should certainly not recommend it after the above results. In the next place they show the value of steel skid and drift wires on planes if the wing tips do hit the ground; moreover in this case the wings were really quite fragile, being merely magnalium tubing single surfaced, but they were not damaged in the least. Other points are the advantage of using two propellers (chain driven), doing away as it does with this torque trouble, to say nothing of necessary wing warping, gyroscopic action, &c.; the advantage of using large wheels if the ground be at all rough or uneven. The wheels in the photo are only two and a half inches diameter.

The advantage also of using a large surface—so that the soaring speed is some 13 to 16 miles an hour instead of 20 to 25.

On the first favourable day, further experiments will be made with the model and altered chassis; this time we shall not, however, commit the initial mistake of taking the model in pieces, but fully assembled and as far as possible tuned up.

Model Flying in Australia.

Mr. H. P. Wood (Melbourne, Victoria), writes: "Noticing your invitation to supply particulars of heavy models, I trust the following information will be of interest. I have built a monoplane, length and span 4 ft.; twin-propellers, diameter 11 ins. each, driven by 8 strands $\frac{1}{4}$ in. strip; weight of complete model 9 oz. This year (to date) it has flown over the quarter-mile five times and on one occasion on a fine calm day 1,740 ft. carefully measured with a survey chain. The photograph shows the model flying at a high altitude. At times considerably over 100 ft. has been obtained. Best duration 71 secs. So far as my observations go, the curvature of the supporting surfaces have a lot to do with the results obtained in the case of heavy models. For instance, in the above model I first tried it with a very slight curve on the main surface and could not obtain flights of more than 250 yards, next nearly the double curvature was tried with the result of the long flight above mentioned. The model has also a very good gliding angle which since the model flies high, adds considerably to the length of the flight."

Mr. C. Ian Burrell's Tractor Model.

We give this week two illustrations of a tractor model, which contains the best design that we have yet seen for a combined protector and landing chassis for models of this type. Total length

33 ins., span 20 ins.; weight 5 ozs. The model rose well from snow and road surfaces—but experienced difficulties in doing the same thing from grass, until fitted with rubber suspensions and the rear wheel. The propellers shown are 7 ins. diameter and 12 ins. pitch, but a new pair 9 ins. diameter and 24 ins. pitch are about to be fitted.

Club Records.

Mr. B. J. Kirchener (Hon. Sec. Ealing and District Ae. Club) writes taking exception to Mr. Burghope's remarks in April 20th issue: "Mr. Burghope says he sees no good in publishing records in his club reports. I maintain that by so doing the progress of the different clubs and also the widespread increase of good model flying can be seen, and also a comparison can be made between various clubs. I am sure that Mr. Burghope is wrong in stating that 'nobody outside the club concerned cares about the records.' Many people I know and myself certainly take a great interest in the doings of clubs all over the country. Regarding the measuring of distances, what is the good of measuring if this is not done accurately? Again, not many models fly 400 yards easily, and in spite of its 'monotony,' the loaded-elevator type model has done more to popularise the sport than any other type—though I personally do not maintain it is by any means the best type. Turning to the tractor model, this is, of course, more for the experienced man than a novice, and even then it is a difficult type of model to fly owing to its sensitiveness."

Replies in Brief.

F. WEBB.—It is not possible to give any satisfactory answer to your query unless you supply fuller particulars. What do you mean exactly, by jump vertically? What was the condition of the ground? What alterations have you since made in the model? &c. It looks as if your model was underpowered.

H. T. HOLMAN.—In reply to your queries. It was somewhat unsurfaced. No carved propellers are or should be more efficient than steamed ones. No—but possibly underwound somewhat; their diameter was small—should try 10 or 11 ins. The model was somewhat heavy for its size, see reply to A. E. Hoadley, last week's issue.

PAUL POOLE.—From the particulars given we should expect the duration would be about 20 to 25 seconds. With the rubber well lubricated and more turns, this could no doubt be increased to a certain extent. The model is rather, but not especially, heavy for its size; what you probably require is a longer frame, say 36 ins., constructed, say, of bass or some lighter wood than ash. You should try and build this so as not to weigh more than 4 ozs. A hollow built up T-frame is the lightest, if you can manage it. Your elevator is much too large in proportion to your main plane; its span should be about one-third. Increase area of main plane, make elevator quite small, and have your c.g. just at leading edge of former, and you should get much better results. About 6 oz. per sq. ft., but it all depends on circumstances; this is for duration, not distance, when it is often more.

THE KITE AND MODEL AEROPLANE ASSOCIATION.

OFFICIAL NOTICES.

Council Meeting.—A meeting of the Council was held on May 2nd, when there were present: Lieut.-Col. F. C. Trollope, in the chair, Mr. H. W. Browne, Mr. C. R. Fairey, Mr. V. E. Johnson, M.A., Mr. F. T. Pringuer, Mr. G. Rowlands, Mr. E. W. Twining, and W. H. Akehurst, hon. sec.

The invitation of Mr. Claude Grahame-White to the Association to hold a model day at Hendon was accepted, and the hon. sec. was instructed to alter the Wakefield Gold Cup Competition so that it could be held on that day, the date suggested being July 25th if suitable to Mr. White.

Registration of model aeroplane performances. The invitation of the Ealing and District Aero Club to hold the trials on their ground (on Saturday, June 15th), viz., the 100-acre field, Greenford, was accepted with thanks.

The Blackheath Aero Club's letter re the trials for May 11th was read, and the hon. sec. stated he had cancelled them on account of being insufficient time to alter ground.

The offer of the club to hold the trials in July on their ground was accepted, or failing their ground being available that they be held on Mitcham Common.

Official Records.—Letters from foreign papers asking for these were read, and the secretary was instructed to supply same.

Visit to National Physical Laboratory.—The kind invitation of Dr. R. T. Glazebrook for the members (and friends) of the association to visit the laboratory at Teddington on Saturday, June 1st, was accepted with thanks, especially as the members will be able to see the apparatus working. The secretary was instructed to arrange for reduced tickets with the S. W. Ry., and fix a suitable train so that the party could arrive at the laboratory at about 2.30. Members and friends wishing to attend must apply to the hon. sec. before Saturday, May 25th. Full details in next issue.

W. H. AKEHURST, Hon. Sec.

27, Victory Road, Wimbledon.

PROGRESS OF FLIGHT ABOUT THE COUNTRY.

Notes regarding Clubs must reach the Editor of FLIGHT, 44, St. Martin's Lane, London, W.C., by first post Tuesday at latest.

MODEL CLUBS.

Blackheath Aero Club (Hon. Sec., A. E. WOOLLARD, 48, HAFTON ROAD, CATFORD, S.E.).

DESPITE rain, excellent work was done last week-end at Grove Park grounds, and at Blackheath. At former ground, Mr. J. H. Dollittle, with a new tractor, obtained best results when a very pronounced dihedral angle was put on the main plane. The "Gnat"

monoplane made some splendid durations, Mr. B. Trask and Mr. F. Whitworth also flying. At Blackheath, Mr. Dollittle and Mr. Whitworth also flying.

During the week Mr. Brown flying with his "Fearless" biplane at Brockley and Grove Park. Mr. A. E. Woollard got best duration of 61 seconds.

On the 25th and 26th of May, the club is holding a contest, so

that a team can be picked solely on the individual merits of the different machines. The team that is picked will represent the club in an inter-club contest v. the Ealing and District Model Aero Club, which is to take place on the latter club's ground at Greenford, on June 8th.

Flying at Grove Park and Blackheath aerodromes this week-end.

Birmingham Aero Club (Model Section) (Secs., R. COBHAM and G. H. WOOD, 8, FREDERICK ROAD, EDGBASTON).

EXHIBITION at Fazeley postponed to Saturday, May 11th. Big surprise for visitors to Billesley Farm on Sunday. The chassis of a pedal-driven aeroplane was found completed, the work on which had only been started at 10 o'clock in the morning by three members. At present rate this machine should be ready within a fortnight. The work on the other two gliders has lately slackened down, but the appearance of a rival machine on the field has worked up the enthusiasm, and both the latter machines should shortly make an appearance.

During afternoon Mr. Trykle succeeded in making a model rise from a bench and make flights of 40 secs. duration. Messrs. G. Wilde, E. Prosser, W. Lunn, and G. Haddon Wood also flying.

Brighton and District Model Aero Club (Hon. Sec. A. VON WICHMANN, "KINGSLEIGH," KINGSWAY, HOVE).

DRIZZLING rain and gusty wind last Saturday at Shoreham made tests with Mr. Burghope's 35½-oz. Nieuport exciting. Altogether model made eleven test flights. Wings wet through. Damage split propeller, after several 25 m.p.h. landings. Mr. Bate got good results with his new 1-1-P₁ models. One did 51 secs.

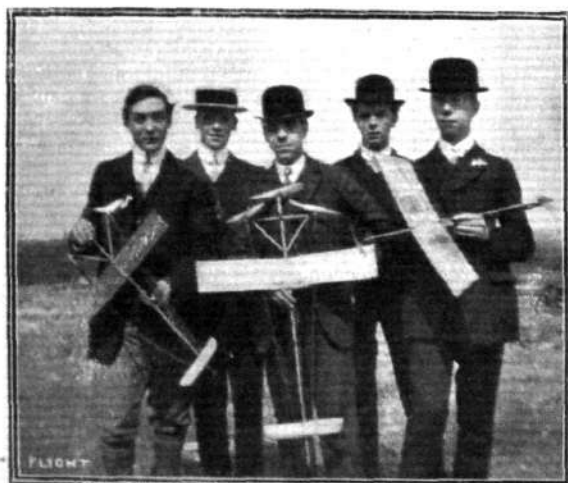
Dover and District Model Aero Club (Sec., H. D. DAVIS, "OAKVILLE," GODWYNE ROAD, DOVER).

ON Saturday, a competition committee was elected consisting of Messrs. J. H. Davis, A. Worster, H. Whorwell, A. G. Wicks, and C. V. Thompson. The committee will deal with the prizes already offered. All models must be fitted with a protector over their motor rod. Tractor and scale models will have special records. The club is having a notice case made which will be fixed in a suitable place in the town.

Ealing and District Aero Club (Sec., B. J. KIRCHNER, 1, QUEEN'S GARDENS, EALING, W.).

No flying on Saturday, but a paper glider competition between several members was held under cover. Winners: B. J. Kirchner and C. Roche. Sunday, at Greenford, Mr. C. Davies with his new all-metal monoplane obtained good durations, and distances up to 300 yards. His best durations were: 43 secs., 38½ secs., 33 secs. C. Chilcott obtained flight of about ¼ mile, and many durations of 25 secs., best 36½ secs. G. Beeching had new tractor (rise-from-the-ground) monoplane. L. Kirchner made flights of approximately 700 ft. D. Chown best duration 27½ secs. The Kite and M.A.A. have accepted club's invitation to hold record trials on their ground.

Fixtures:—June 8th, Contest v. Blackheath Ae. Club—duration and distance, at Greenford. June 15th, K. and M.A.A. hold trials for records, at Greenford. Particulars from hon. sec. Flying on Saturday and Sunday next. The use of protectors on models will receive the consideration of the committee at next meeting.



A few of the leading members of the Hackney and District Aero Club who get some of their practice at Hackney Marshes.

East Ham and District Aero Club (Sec., C. SHARP, 54, SAVAGE GARDENS, EAST HAM).

KITE flying last week by Messrs. Shimmen and Joyce. The model section came to grief early owing to gusty wind. Owing to change of ground members and prospective members meet at Beckton Road crossing, High Street, at 3 p.m. sharp Saturday.

Hackney and District Aero Club (Sec., B. H. LONGSTAFFE, 47, JENNER ROAD, STOKE NEWINGTON, N.).

NEXT meeting at Spensley Hall, June 7th, when exhibition of models will take place. Duration contest next Saturday, for pair of 10 in. carved propellers.

Manchester Model Ae.C. (40, BIGNOR STREET, CHEETHAM).

MEETING on Saturday was cancelled. Meeting to-day (Saturday) at 2.30 p.m. at Aerodrome, Old Trafford Park. Two prizes of 7s. 6d. and 2s. 6d. for efficiency. The formula to be used is:—
Weight of model in oz. × duration of flight

Weight of elastic used

Committee meeting May 13th, at 7.30 p.m.

Paddington and Districts Aero Club (Sec., W. E. EVANS, 133, BUCHANAN GARDENS, HARLESDEN).

AT committee meeting last week, silver and bronze medals, latter for novices, suggested to be awarded each month for duration, no member to win more than one medal during the same season, except that novices may win a bronze medal, and later on a silver one. First competition for monthly duration medals probably May 25th.

On Sunday, Mr. F. Lane qualified for second-class certificate with 914 ft. distance, having previously qualified for duration. Mr. L. Holden failed to pass distance test by only 2 ft. Mr. M. Levy also failed by 60 ft. and Mr. C. Levy by about 50 ft. Messrs. Carter and Woolley flying Fleming-Williams type models.

Inter-club contest with Hackney and District Club May 18th.

Palmer's Green and District Model Aero Club (41, ELVENDON ROAD, PALMER'S GREEN, N.).

MR. R. L. ROGERS having resigned the secretaryship, Mr. A. D. Trollope was elected on Saturday in his stead, a hearty vote of thanks being passed to Mr. Rogers for his splendid work during his term of office. Open single-tractor competition June 1st, details next week.

Reigate, Redhill and District Aero Club (Sec., H. V. MAY, 4, LONDON ROAD, REIGATE).

MR. OSBORNE took his 3rd class "ticket" on Wednesday. Mr. Norton obtained flights of 231, 270 and 283 yards straight measurement, and Mr. May's best durations were 40, 38 and 36 secs. Mr. Norton has offered a prize for the first flying model turned out from the club workshop. The competition for the Rawson Cup has been arranged, and is as follows:—(1) Longest straight flight; (2) Longest duration; (3) Flight to a given point. All three tests to be attempted with the same model; three flights allowed in each test. Flying to-day (Saturday) at Earlswood and Buckland.

St. Mary's Model Aero Club (Sec., H. W. A. JOHNSON, THE VICARAGE, KINGSTON, PORTSMOUTH).

SATURDAY, at Purbrook, very successful, Harper, Roberts and Eburne very persistent with "Burs." Webb passed two or three tests for 3rd class "ticket." Restall and Johnson doing big things with "single screws" others making excellent progress. May Monthly aggregate competition to-day (Saturday) at 2.30. Evening meeting at Canoe Lake, for hydro-aeroplanes. 7 o'clock sharp.

Salisbury Model Aero Club (Sec., E. M. LEAR, VICTORIA COFFEE ROOMS, BUTCHER ROW).

COMPETITION is to be arranged for "rise-off-the-ground" models shortly, to encourage construction. Also construction of hydro-aeroplanes is to be encouraged if sufficient number are available.

Scottish Ae.S. Model Aero Club (6, McLELLAN STREET, GOVAN).

ON Saturday, at racecourse, Paisley, good flights by Mr. J. C. Balden with his twin-screw racer, Mr. Ross and his small single-screw. In evening, at Bellahouston, Mr. Gordon had some brilliant flights with his new single-screw machine with Etrich-type plane, the model climbing to a great altitude and displaying marked lateral stability. No hydro meeting at Maxwell Park to-day (Saturday) as members are going to the docks to bid farewell to club chairman, Mr. Geo. P. Currie, who is going out to Canada by the s.s. "Saturnia." Mr. Currie has done good work in Scotland for the cause of aviation by lecturing throughout the country and in

many other ways. His departure, therefore, will be a distinct loss to the club and it is to be hoped that he will continue his efforts in the new land he goes to.

Next flying meeting, monthly competition at Barrhead, on May 18th.

Sheffield Model Aero Club (Hon. Sec. C. F. W. CUDWORTH, 35, PENRHYN ROAD, SHEFFIELD).

MEETING on May 2nd, Mr. A. V. Kavanagh in chair. Mr. E. W. Colver, who was present, was heartily thanked for his cup, to be known as the Colver Cup, and silver aviation medal, &c., to be competed for by self-rising model aeroplanes. Mr. Colver has offered to lend aeronautical books to the members, including some of the finest books written on aviation. Main item on programme for Whit Monday, the Colver Cup. The other event, time permitting, for duration. Great things are being looked forward to from Master C. E. Worrall, a member aged 8, who, under the supervision of his father, has himself constructed models which have flown over 1,000 ft.

Stony Stratford and District Kite and Model Aero Club (Hon. Sec., O. HAMILTON, JUN., OLD STRATFORD).

OWING to rain on Saturday, the postponed competitions were further postponed. Members who intend to fly for the monthly prize can obtain entry forms from the secretary, together with the

Club Competition Rules. Members wishing to set up club records under the new rules, please give a day's notice to secretary, so that arrangements can be made for observers. Only flights on the club ground on open days, viz., Wednesday, Thursday, and Saturday, can count in monthly competitions, but flights made on any other ground, so long as the flights are witnessed by two club members, will count for record establishment.

Whitehead (Belfast) Model Aero Club (Hon. Sec., JACK TURTLE, INNISFALLEN, WHITEHEAD, CO. ANTRIM).

ON Saturday, in gusty wind, Whiting's Trykle-type model rose against wind to great height, flew 40 yards, turned, flew over his head with wind at high speed, out of flying grounds, and landed in a garden 200 yards away. On several evenings during the week good work has been done.

The secretary would like to know if there are any other model clubs in the vicinity of Belfast, and if so, would the secs. please communicate with him.

Windsor Model Flying (Sec., S. CAMM, 10, ALMA ROAD).

SUNDAY, Camm, Dowsett and Stanbrook in the Great Park, had flights, average 45 secs. To-day (Saturday) at 2.30, a contest under the formula: Duration \times total weight of machine for a pair of propellers, kindly offered by Mr. M. L. Rolfe.

✱ ✱ ✱ ✱

CORRESPONDENCE.

* * The name and address of the writer (not necessarily for publication) MUST in all cases accompany letters intended for insertion, or containing queries.

Correspondents communicating with regard to letters which have appeared in **FLIGHT**, would much facilitate ready reference by quoting the number of each letter.

Gyroscopes on Aeroplanes.

[1545] Referring to your criticisms of the Clarke-Johnson system of gyroscopic control in your issue of April 27th last, I would like, with your permission, to make the following reply:—

Rounding a Curve.—The gyroscopic disc being vertical, with its plane transverse to the machine, then on turning either to the right or left—the gyroscopic disc will (as you observe) in either case, tend to be left behind; its tendency being to keep its plane of rotation constant—if arranged for *longitudinal stability*—this would at once interfere with the proper control of the elevator. Supposing we place the gyroscope, with its plane of rotation horizontal, then there will still be interference when rounding a curve, in one direction, if not in both. But, if we use *two* gyroscopes, as shown in the accompanying sketch, then this difficulty is quite successfully overcome. For such a system does not offer any resistance to purely lateral displacement, but only when its plane of rotation is altered.

Referring to *lateral stability* (the one to which the reference was more specially meant), there banking is requisite and therefore (presumably) *one* gyroscope is, or may be sufficient in this case, if the "lag" of the gyroscope be so arranged as to give the correct banking. If this be not feasible, or if it be objectionable, then, here also *two* gyroscopes must be used as in the case of longitudinal stability. In any case this objection can be quite successfully overcome. As the gyroscopes need only weigh 3 or 4 ozs. each the weight is no objection. For the complete stabilisation of an aeroplane, at least three gyroscopes are essential, and if three be found inadequate, then the correct number is four.

The Neutral Point.—In order to avoid "hunting," there must, of course, be perfect synchronism between the controller and the balancing devices, but it is by no means essential, as Mr. Clarke clearly showed, that either the relay system or the gyroscope need have a fixed point of reference, i.e., that the neutral point should be a fixed one on the apparatus, though fixed in a sense as to their combined movements. There must, of course, be absolute proportional agreement, and when one of the balancing devices is in its normal position—the gyroscopic control must be similarly situated; but this position need not be fixed absolutely. It is extremely difficult to make this point clear in writing, though easy enough to demonstrate with the apparatus in question.

As to whether there always would be this proportionate agreement in the apparatus and an entire absence of hunting, is one which practice probably alone could really show. It is the crux of the whole problem, and one on which I have reflected much, with the result that I have personally evolved another system of gyroscopic control in which hunting is impossible. It may appear somewhat cocksure to speak thus confidently, but the reason is simply that in this device *every position in which the balancing device is left is a normal one*, from which it is an obvious inference that the balancing

device is different from those now in use, but such a necessity might be a vital point in the solution of the problem.

Referring to your remarks on "the idea of using the gyroscope itself for the operation of the balancing planes, &c.," I can only refer you to *Comptes Rendus*, January 16th, 1911, and to the successful results there claimed to have been accomplished by such a stabilising system on the part of Captain L. Girardville. *Re Time Lag*—on the part of the system—this is the one part of the system on which I have not a particle of doubt, basing my conclusion on a very large number of experiments made with hand-worked and automatically controlled stilt gyroscopes. In such experiments the

| | | |
|-----------------|--------------|-------------------------|
| Mind lag | } : time lag | } :: 5 : 1 { at least } |
| Hand-controlled | | |

Moreover, another point (a point not especially dwelt on, even if alluded to by Mr. Clarke) is the highly anticipatory character of the gyroscopic controller after the initial disturbance—it being this peculiarity which is a main factor in successfully damping out all oscillations in all forms of gyroscopic control. It is, of course, important to keep the inertia of the moving parts as small as possible. This anticipatory action referred to can be clearly demonstrated experimentally, but cannot be briefly explained in writing.

I quite agree with your remarks that an ordinary relay mechanism does not permit of much or even, sometimes, of any variation in its rate of operation. And in devising my new system I have employed the idea of time as well as rate. A small rate of recovery, if it be continued long enough, will effect the desired result—always supposing that the circumference of the machine's radius of recovery is nowhere a tangent to mother earth. In the Clarke-Johnson system the rate of operation can, however, clearly be further regulated by employing more electrical contacts should such be found necessary.

With respect to possible interference between the coupled-up hand and automatic control, the mere turning of a switch, or the pressing of a button can instantly put the gyroscopic control out of action.

V. E. JOHNSON.

Natural Stability.—The "Redivalls" Principle.

[1546] In reply to your correspondent, Mr. B. F. Hussey [1543], I beg to point out that what he terms the "diamond-shaped piece in the centre of the main plane" is the only patent I possess *re* aviation. My letter [1504] therefore refers to same. I hope to write an article very soon, which will enable **FLIGHT** readers to easily make a "Redivalls" type model monoplane, at a small cost.

"Redivalls," Eccles.

WILL. H. BOOTH.

[1547] For the benefit of Mr. B. F. Hussey, the public in general, and posterity in particular, let me once for all clear up the confusion which has evidently arisen.

"Redivalls" (Mr. W. H. Booth) is the designer and patentee of the model with the "diamond-shaped piece, or chamber, in the centre of the plane + dihedral angle."

Mr. William Booth is the designer and patentee of the model with the upturned (at right angles) tips to the ends of the plane; no dihedral angle necessary.

Naturally we each consider our own system the better one. Personally I am prepared to back my system against all comers, and am prepared to challenge the world of model makers to any contest it likes for the title of stability champion.

WILLIAM BOOTH.

Astley Mount, Half Edge Lane, Eccles.



THE JAMES MEANS CONTROL.

OUR readers are becoming acquainted with the name of James Means, who, as will be observed from our advertisement pages this week, offers a prize of £200 for flights to take place under certain conditions with machines fitted with his special control. According to his own description, the control is based on the principle of mental automatism; but the accompanying sketch and brief description will doubtless serve to convey a more exact impression of its construction. In the sketch, there is a handle bar, C, rigidly attached to a tube, A, having a rotary movement so as to control through the fork, E, the wires, K, that actuate the steering rudder. The tube, A, is pivoted about a rod, B, which is itself fitted with a fork, F, that is mounted so that it can rock upon the transverse shaft, D, thus communicating a to-and-fro motion to the rod, L, that is coupled up to the elevator. In addition to this movement, the apparatus as a whole is pivoted longitudinally in its supports by the fore and aft rod, H, which is turned up at one end for the attachment of the wires, J, that operate the balancing flaps or wing warping. D is a grip for single hand control.

For working the elevator, the handle-bar is moved to and fro. For balancing it is moved from side to side, and for steering it is rotated upon its own axis.



A REAL SAFETY JACKET.

It is difficult to understand the neglect by aviators, when crossing any lengthy stretch of water, to supply themselves with some means of safety in case of sudden immersion. There are the ordinary cork belts, for want of anything better, but it is hardly necessary in the face of proved facts to be encumbered with such impedimenta. There is the Read floating jacket, the invention of H. H. Read, of Falmouth, which is fashioned, amongst other forms, as a Norfolk jacket, and with this on instead of an ordinary coat no pilot need fear drowning even if in the water for a considerable period. The jacket has been tested again and again and has maintained its reputation. In fact, in a report recently issued, it is set forth that these jackets, by way of test, have been placed in the open sea with iron weighing 17 lbs. attached (this weight being in excess of the Board of Trade regulation). They have then remained for 24 hours without the slightest sign of sinking, parts of the jacket not even being wet. It is therefore claimed that a man with one of these jackets on (properly buttoned up) could not only save himself but would have sufficient spare buoyancy to float a companion.

These garments may be worn next to the skin, over an overcoat, over or under oilskins with the same effect, and also can be worn as an ordinary jacket on shore. It is deplorable under such circumstances that any lives should be sacrificed, as in the case of Mr. Allen, for the want of a little precaution.

Dorman and Co. to Build Adams' Engines.

THE well-known engineering firm of W. H. Dorman and Co., of Stafford, announce that they have purchased the business of Mr. W. L. Adams, of the Redbridge Motor Works, Southampton, and are arranging to transfer the plant to their own factory for the purpose of manufacturing the Adams' engines. Mr. Adams has been appointed engineer and sales expert to the new department, and, with the resources of this firm behind him, developments of an interesting and most important character may be anticipated in the near future. There are a good many points in the Adams' design that are worthy of being evolved to a conclusive issue, which alone is possible when the manufacturers are free from the necessity of making economy the first consideration of their manufacturing methods.

The Hanriot in England.

MR. MAURICE DUCROCQ is already making arrangements for Hanriot developments since the registration of Hanriot (England), Ltd. He has machines already building in England, and no doubt the War Office will keep a watchful eye upon this very important little monoplane. The English company has acquired all the patents the French company have taken out, one of these being for the general arrangement of the landing chassis, and the British-built article will keep in line with all improvements on the original models, being constructed from the French working drawings.



PUBLICATIONS RECEIVED.

National Physical Laboratory Report for the Year 1911. Teddington: The National Physical Laboratory.
National Physical Laboratory: Collected Researches. Vol. VIII, 1912. Teddington: The National Physical Laboratory.
The Flight of Birds. By F. W. Headley, M.B.O.U. London: Witherby and Co., 326, High Holborn. Price 5s. net.
The Mechanics of the Aeroplane. By Captain Duchene. Translated by John H. Ledebore, B.A., and T. O'B. Hubbard. London: Longmans, Green, and Co. Price 7s. 6d. net.



Aeronautical Patents Published.

Applied for in 1911.

Published May 16th, 1912.

9,873. F. W. LANCHESTER. Two-stroke cycle I.C. engines.
 9,926. M. JASOGNE AND T. DOBRESKO. Aeroplanes.
 12,739. J. J. P. KOECHLIN. Resilient supporting apparatus for aërial machines.
 15,413. E. EBBINGHAUS. Aeroplanes.

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